

**THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant(s): Barton et al.
Appl. No.: 10/691,806
Conf. No.: 6662
Filed: October 21, 2003
Title: APPARATUS AND METHOD FOR PROVIDING POINT OF PURCHASE
PRODUCTS
Art Unit: 3653
Examiner: J. Shapiro
Docket No.: 112703-294

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

Sir:

Appellants submit this Appeal Brief in support of the Notice of Appeal filed on June 5, 2007. This Appeal is taken from the Final Rejection in the Office Action dated March 27, 2007.

I. REAL PARTY IN INTEREST

The real party in interest for the above-identified patent application on appeal is Wm. Wrigley Jr. Company by virtue of an Assignment dated 2/16/05 and recorded at reel 015726, frame 0129 in the United States Patent and Trademark Office.

II. RELATED APPEALS AND INTERFERENCES

Appellants filed a Notice of Appeal on November 20, 2003 and an Appeal Brief on January 19, 2004 for U.S. Pat. Application Serial No. 09/960,915, from which the currently appealed application is a divisional of. Appellants filed a Notice of Appeal on February 1, 2005 and an Appeal Brief on April 1, 2004 for U.S. Pat. Application Serial No. 10/713,333, which is a continuation of U.S. Pat. Application Serial No. 09/960,915. Appellants previously submitted an Appeal Brief for the pending application in support of the Notice of Appeal filed on February 1, 2005. This former Appeal was taken from the Final Rejection in the Office Action dated December 15, 2004. The Patent Office sent a non-final Office Action dated December 7, 2006 that reopened prosecution on Claims 44-68, 76 and 102-111. Appellants submitted a Response to the non-final Office Action on March 6, 2007. The Patent Office mailed a Final Rejection in the Office Action dated March 27, 2007. Appellants filed a Notice of Appeal on June 5, 2007. This current Appeal is taken from the Final Rejection in the Office Action dated March 27, 2007.

III. STATUS OF CLAIMS

Claims 44-68, 76 and 102-111 are pending in the above-identified patent application. Claims 1-43, 69-75 and 77-97 have been canceled previously. Claims 98-101 have been withdrawn previously. Claims 44-68, 76 and 102-111 stand rejected. Therefore, Claims 44-68, 76 and 102-111 are being appealed in this Brief. A copy of the appealed claims is included in the Claims Appendix.

IV. STATUS OF AMENDMENTS

A Final Office Action was mailed on March 27, 2007. In the Office Action, the Examiner maintained the anticipation and obviousness rejections. Appellants filed a Notice of Appeal on June 5, 2007 in reply to the Final Office Action. No amendments were made in this application after the final rejection in the Office Action dated March 27, 2007. A copy of the Office Action dated March 27, 2007 ("Office Action") is attached as Exhibit A in the Evidence Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

A summary of the invention by way of reference to the drawings and specification for each of the independent and dependent claims is provided as follows:

Independent Claim 44 is directed to a method of operating an automated checkout comprising: allowing a consumer to bring purchasable items to an automated checkout device (page 6, lines 4-5); allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display (page 6, lines 5-6); allowing the consumer to select a product from a dispensing device located in juxtaposition to the automated checkout (page 6, lines 6-8); automatically dispensing the product from the dispensing device in response to the consumer's selection (page 6, lines 8-9); and automatically adding a cost of the product to the cost for the scanned items on the display (page 6, lines 8-9).

Dependent Claim 45 is directed to the method of Claim 44, wherein the consumer selects the product by using a touch screen (page 19, lines 3-10).

Dependent Claim 46 is directed to the method of Claim 44, including the step of allowing the consumer to pay for the product by credit/debit card (page 15, lines 4-5).

Dependent Claim 47 is directed to the method of Claim 44, wherein adding the cost of the product includes automatically increasing a balance due on a credit/debit card transaction (page 33, line 24 to page 34, line 2).

Independent Claim 48 is directed to a method of operating a checkout station comprising: allowing a consumer to bring purchasable items to a store operator (page 6, lines 10-11); allowing the operator to scan the purchasable items and accumulate a cost for the scanned items (page 6, lines 11-13); allowing the consumer to independently purchase a product by touching a screen coupled to a dispensing device (page 19, lines 3-10;); dispensing the product from the dispensing device in response to the consumer touching the screen, the dispensing device being located at the checkout station and thereby storing product at the checkout station (page 19, lines 3-10); and automatically adding a cost of the dispensed product to the cost for the scanned items (page 6, lines 15-16).

Independent Claim 49 is directed to a method of operating a checkout station comprising: employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items (page 6, lines 17-19); prompting a consumer to purchase a product from a

dispensing device (page 8, lines 19-20); automatically dispensing the product from the dispensing device upon the consumer's request (page 8, lines 20-21); and automatically adding a cost of the product to the cost for the purchasable items (page 8, lines 21-22).

Independent Claim 50 is directed to a method for providing a point of purchase product without the need for a cashier comprising: providing a checkout area for the consumer to bring items for purchase (page 6, lines 23-25); accumulating a cost associated with the items the consumer wants (page 6, line 24); providing a product at the point of purchase (page 6, line 25); prompting the consumer that other product is available at the point of purchase (page 6, line 25); dispensing the product to the consumer at the point of purchase upon a request by the consumer to purchase the product (page 6, lines 25-27); and automatically, without need for a cashier, adding to the cost associated with other items purchased any additional cost for the product (page 6, lines 27-28).

Dependent Claim 51 is directed to the method of Claim 50, which includes accepting a single payment in exchange for the product and other purchased items (page 6, lines 29-30).

Dependent Claim 52 is directed to the method of Claim 50, wherein the consumer is prompted that the product is available by an advertisement for the product (page 6, lines 31-32).

Dependent Claim 53 is directed to the method of Claim 50, wherein prompting the consumer includes prompting the consumer at a time selected from the group consisting of: before the consumer purchases the other consumable items, while the consumer is purchasing the other items and after the consumer purchases the other items (page 7, lines 1-2 and page 36, lines 10-21).

Dependent Claim 54 is directed to the method of Claim 50, which includes allowing a retail operator to enter the consumer's approval to purchase the product (page 7, lines 3-4).

Dependent Claim 55 is directed to the method of Claim 50, which includes allowing the consumer to enter the approval to purchase the product (page 7, lines 5-6).

Independent Claim 56 is directed to a method for providing different products at a point-of purchase comprising: stocking a plurality of different products at the point of purchase (page 7, lines 8-9); automatically prompting the consumer that the products are available at the point of purchase (page 7, lines 10-11); automatically accepting an approval by the consumer to purchase at least one of the products (page 7, lines 11-12); automatically dispensing the at least one the product to the consumer at the point of purchase (page 7, lines 12-15); and automatically adding

to the cost of the product to the cost of any other items that are being purchased (page 7, lines 14-15).

Dependent Claim 57 is directed to the method of Claim 56, wherein prompting the consumer that the products are available includes displaying a dynamic display selected from the group consisting of: a display of the products, a message concerning the products, an advertisement concerning the products and a price reduction concerning the products (page 7, lines 16-17 and page 18, lines 17-30).

Dependent Claim 58 is directed to the method of Claim 56, which includes allowing a retail operator to enter the consumer's approval to purchase the at least one product (page 7, lines 3-4).

Dependent Claim 59 is directed to the method of Claim 56, which includes allowing the consumer to enter the approval to purchase the at least one product (page 7, lines 5-6).

Independent Claim 60 is directed to a method for providing consumable and non-consumable products at the same location comprising: stocking consumable and non-consumable products in a single device (page 7, lines 19-20); allowing a consumer to purchase a consumable product from the single device without the need for a cashier (page 7, lines 20-21); allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier (page 7, lines 21-23); dispensing the consumable and non-consumable product to the consumer at the same location in the device (page 7, lines 21-23); and allowing the consumer to pay for the consumable and non-consumable product without the need for money (page 7, lines 23-24).

Dependent Claim 61 is directed to the method of Claim 60, which includes allowing the consumer to pay for the consumable and non-consumable product at one time (page 7, lines 25-26).

Independent Claim 62 is directed to a method of generating revenue comprising: providing a point of purchase device that is coupled to the retail purchasing device, the point of purchase device designed to dispense a product at the point of purchase (page 7, lines 28-30); and obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device (page 7, lines 27-30).

Dependent Claim 63 is directed to the method of Claim 62, wherein the point of purchase device is integral with the retail purchasing device (page 32, lines 1-8).

Dependent Claim 64 is directed to the method of Claim 62, wherein the retail purchasing device is selected from the group consisting of: a self-scanning purchasing device, a fuel dispensing gasoline pump, a debit/credit card reader and a cash register (page 8, lines 1-3).

Independent Claim 65 is directed to a method for purchasing items comprising the steps of transporting a plurality of items to a checkout station (page 8, lines 6-7); using a device that identifies costs for the items to create a purchase price for the plurality of items (page 8, lines 6-7); prompting a consumer to purchase a point of purchase product (page 8, lines 8-9); dispensing from a dispenser the point of purchase product (page 8, lines 9-10); and automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price (page 8, lines 10-11).

Dependent Claim 66 is directed to the method of Claim 65, wherein the cost of the point of purchase product is added to the purchase price before the cost of all of the plurality of items is totaled (page 8, lines 12-13).

Dependent Claim 67 is directed to the method of Claim 65, wherein the device that identifies costs is an optical scanner (page 8, line 14).

Dependent Claim 68 is directed to the method of Claim 65, wherein the point of purchase product is dispensed from a device that is integral with the device that identifies costs (page 8, lines 15-16).

Independent Claim 76 is directed to a method for dispensing a point of purchase product comprising the steps of: providing a purchasable item and a point of purchase product for sale to a retail customer (page 9, lines 1-4); storing the point of purchase product at a point of purchase location for the purchasable item (page 9, lines 1-4); inputting a customer selection for the point of purchase product to a retail customer terminal proximate the point of purchase location for the purchasable item, the retail customer terminal adapted to process the customer selection for the point of purchase product and a customer selection for the purchasable item (page 9, lines 1-6); processing the customer selection for the point of purchase product for electrical communication with a point of purchase dispenser proximate the point of purchase location for the purchasable item (page 9, lines 5-8); and dispensing the point of purchase product to the customer from the point of purchase dispenser responsive to the electrical communication and adding a cost of the point of purchase product to a purchasable item cost automatically (page 9, lines 8-10).

Independent Claim 102 is directed to a method of operating an automated checkout comprising: allowing a consumer to bring purchasable items to an automated checkout device (page 6, lines 3-5); allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display (page 6, lines 5-9); allowing the consumer to select, by touching the display, a product from a dispensing device that stores and dispenses product at a location that is in juxtaposition to an area that a consumer occupies as he operates the automated checkout (page 6, lines 6-8 and page 19, lines 3-10); automatically dispensing the product from the dispensing device in response to the consumer touching the display (page 6, lines 8-9 and page 19, lines 3-10); and automatically including, without the need for a cashier, a cost of the product with the cost for the scanned items on the display in response to the consumer touching the display (page 6, lines 8-9 and page 19, lines 3-10).

Dependent Claim 103 is directed to the method of Claim 102, wherein the dispensing device is part of the automated checkout (page 36, lines 4-9).

Dependent Claim 104 is directed to the method of Claim 102, including the step of allowing the consumer to pay for the product by credit/debit card (page 5, lines 3-10).

Dependent Claim 105 is directed to the method of Claim 102, wherein the dispensing device is integral with the automated checkout (page 36, lines 4-9).

Independent Claim 106 is directed to a method of operating a checkout station comprising: allowing a consumer to bring purchasable items to a store operator (page 4, lines 20-22 and page 19, lines 3-10); allowing the operator to scan the purchasable items and accumulate a cost for the scanned items (page 4, lines 22-23 and page 19, lines 3-10); storing a plurality of point of purchase products in a dispenser at the checkout station (page 19, lines 3-10); providing a screen that has a dynamic display capable of displaying an advertisement for at least one of the plurality of point of purchase products (page 19, lines 3-10); allowing the consumer to purchase the point of purchase product by touching the screen (page 19, lines 3-10); dispensing the product from the dispensing device in response to the consumer touching the screen (page 4, lines 23-24 and page 19, lines 3-10); and automatically including and adding a cost of the dispensed product to the cost for the scanned items in response to the consumer touching the screen without any other action by the consumer or the operator (page 4, lines 24-25 and page 19, lines 3-10).

Independent Claim 107 is directed to a method of operating a checkout station comprising: employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items (page 8, lines 17-19 and page 19, lines 3-10); prompting a consumer, through the use of a display, to purchase a plurality of different products from a dispensing device (page 8, lines 19-20 and page 19, lines 3-10); allowing the consumer to select at least one of the plurality of products by touching a portion of the checkout station (page 19, lines 3-10); automatically dispensing the product from the dispensing device upon the consumer's touching of a portion of the checkout station (page 19, lines 3-10); and automatically adding, without any action of the operator, a cost of the product to the cost for the purchasable items in response to the consumer touching a portion of the checkout station (page 19, lines 3-10).

Independent Claim 108 is directed to a method for providing a chewing gum product to a consumer at a checkout area comprising: providing a checkout area that allows a consumer to checkout without the need for a cashier (page 6, lines 22-23 and page 16, lines 9-16); providing an area for allowing a consumer to bring items the consumer wants to purchase (page 6, lines 23-25 and page 16, lines 9-16); accumulating a cost associated with the items the consumer wants to purchase (page 6, line 25 and page 16, lines 9-16); storing a chewing gum product at the point of purchase in a dispenser (page 6, lines 22-28 and page 16, lines 9-16); prompting the consumer that the chewing gum product is available at the point of purchase (page 6, lines 25 and page 16, lines 9-16); dispensing the chewing gum product to the consumer at the point of purchase in response to the consumer touching a screen (page 6, lines 25-27 and page 16, lines 9-16); and automatically, without the need for a cashier, adding a cost associated with chewing gum purchased to the cost associated with the items in response to the consumer touching the screen (page 6, lines 27-28 and page 16, lines 9-16).

Independent Claim 109 is directed to a method for providing different products including confectionary products at a point of purchase comprising: stocking a plurality of different confectionary products at the point of purchase (page 16, lines 9-16, and page 22, lines 7-23); automatically prompting, through the use of a dynamic display, the consumer that the confectionary products are available at the point of purchase (page 16, lines 9-16 and page 22, lines 7-23); allowing the consumer to select, through the use of the dynamic display, at least one confectionary product to purchase (page 16, lines 9-16, page 19, lines 3-10 and page 22, lines 7-

23); automatically dispensing the at least one the confectionary product to the consumer at the point of purchase in response to the consumer touching the dynamic display (page 16, lines 9-16, page 19, lines 3-10 and page 22, lines 7-23); and automatically adding to the cost of the product to the cost of any other items that are being purchased in response to the consumer touching the dynamic display (page 16, lines 9-16, page 19, lines 3-10 and page 22, lines 7-23).

Independent Claim 110 is directed to a method for providing confectionary and non-consumable products at the same location comprising: stocking confectionary and non-consumable products in a single device (page 7, lines 19-20 and page 33, lines 21-31); allowing a consumer to purchase a confectionary product from the single device without the need for a cashier (page 7, lines 20-21 and page 33, lines 21-31); allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier (page 7, lines 21-23 and page 33, lines 21-31); dispensing the confectionary and non-consumable product to the consumer at the same location (page 33, lines 21-31); totaling the cost for the confectionary and non-consumable product (page 33, lines 21-31); and allowing the consumer to pay for the confectionary and non-consumable product without the need for money (page 7, lines 23-24 and page 33, lines 21-31).

Independent Claim 111 is directed to a method for purchasing items comprising the steps of transporting a plurality of items to a checkout station; using a means for identifying costs to identify the costs for the items and create a purchase price for the plurality of items (page 21, line 26 to page 22, line 14 and Figure 2, elements 30a); providing a means for prompting the purchase of point of purchase products (page 22, lines 7-23 and Figure 2, elements 30a); prompting through the use of the means for prompting the purchase a consumer to purchase at least one of a group of point of purchase products (page 22, lines 7-23); allowing the consumer to use the means for prompting the purchase to select one of the group of point of purchase products (page 22, lines 7-23); dispensing from a means for dispensing the point of purchase product (page 24, lines 17-31 and Figure 2, element 54); and automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price (page 8, lines 6-11).

Although specification citations are given in accordance with C.F.R. 1.192(c), these reference numerals and citations are merely examples of where support may be found in the specification for the terms used in this section of the Brief. There is no intention to suggest in

any way that the terms of the claims are limited to the examples in the specification. As demonstrated by the citations below, the claims are fully supported by the specification as required by law. However, it is improper under the law to read limitations from the specification into the claims. Pointing out specification support for the claim terminology as is done here to comply with rule 1.192(c) does not in any way limit the scope of the claims to those examples from which they find support. Nor does this exercise provide a mechanism for circumventing the law precluding reading limitations into the claims from the specification. In short, the specification citations are not to be construed as claim limitations or in any way used to limit the scope of the claims.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Claims 62-64 are rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6,882,900 to Terranova (“*Terranova*”). A copy of *Terranova* is attached herewith as Exhibit B.
2. Claims 44-68, 76 and 102-111 stand rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 5,816,443 to Bustos (“*Bustos*”) in view U.S. Patent No. 5,992,570 to Walter et al. (“*Walter*”) and in further view of *Terranova*. A copy of *Bustos* and *Walter* are attached herewith as Appendices C and D, respectively.

VII. ARGUMENT

A. LEGAL STANDARDS

1. Anticipation under 35 U.S.C. § 102

Anticipation is a factual determination that “...requires the presence in a single prior art disclosure of each and every element of a claimed invention.” *Lewmar Marine, Inc. v. Barient, Inc.*, 3 U.S.P.Q. 2d 1766 (Fed. Cir. 1987). Moreover, “[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil of California*, 2 U.S.P.Q.2d 1051, 1053 (Fed. Cir. 1987) (*emphasis added*).

Federal Circuit decisions have repeatedly emphasized the notion that anticipation cannot be found where less than all elements of a claimed invention are set forth in a reference. *See, e.g. Transclean Corp. v. Bridgewood Services, Inc.*, 290 F.3d 1364 (Fed. Cir. 2002). In this regard, a reference disclosing “substantially the same thing” is not enough to anticipate. *Jamesbury Corp. v. Litton Indust. Prod., Inc.*, 756 F.2d 1556, 1560 (Fed. Cir. 1985). A reference must clearly disclose each and every limitation of the claimed invention before anticipation may be found.

Further, anticipation cannot be shown by combining more than one reference to show the elements of the claimed invention. *In re Saunders*, 444 F.2d 599 (C.C.P.A. 1971). All elements of a claimed invention must be disclosed in one, solitary reference. As such, it is clear that a reference cannot be utilized to render a claimed invention anticipated without identical disclosure.

2. Obviousness under 35 U.S.C. § 103

The Federal Circuit has held that the legal determination of an obviousness rejection under 35 U.S.C. § 103 is:

whether the claimed invention as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made...The foundational facts for the prima facie case of obviousness are: (1) the scope and content of the prior art; (2) the difference between the prior art and the claimed invention; and (3) the level of ordinary skill in the art...Moreover, objective indicia such as commercial success and long felt need are relevant

to the determination of obviousness...Thus, each obviousness determination rests on its own facts.

In re Mayne, 41 U.S.P.Q. 2d 1451, 1453 (Fed. Cir. 1997).

In making this determination, the Patent Office has the initial burden of proving a *prima facie* case of obviousness. *In re Rijckaert*, 9 F.3d 1531, 1532, 28 U.S.P.Q. 2d 1955, 1956 (Fed. Cir. 1993). This burden may only be overcome “by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings.” *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1988). “If the examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent.” *In re Oetiker*, 24 U.S.P.Q. 2d 1443, 1444 (Fed. Cir. 1992).

Of course, references must be considered as a whole and those portions teaching against or away from the claimed invention must be considered. *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve Inc.*, 796 F.2d 443 (Fed. Cir. 1986). “A prior art reference may be considered to teach away when a person of ordinary skill, upon reading the reference would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Applicant.” *Monarch Knitting Machinery Corp. v. Fukuhara Industrial Trading Co., Ltd.*, 139 F.3d 1009 (Fed. Cir. 1998), quoting, *In re Gurley*, 27 F.3d 551 (Fed. Cir. 1994).

B. THE CLAIMED INVENTION

Independent Claim 44 is directed to a method of operating an automated checkout comprising: allowing a consumer to bring purchasable items to an automated checkout device; allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display; allowing the consumer to select a product from a dispensing device located in juxtaposition to the automated checkout; automatically dispensing the product from the dispensing device in response to the consumer's selection; and automatically adding a cost of the product to the cost for the scanned items on the display.

Independent Claim 48 is directed to a method of operating a checkout station comprising: allowing a consumer to bring purchasable items to a store operator; allowing the operator to scan the purchasable items and accumulate a cost for the scanned items; allowing the consumer to

independently purchase a product by touching a screen coupled to a dispensing device; dispensing the product from the dispensing device in response to the consumer touching the screen, the dispensing device being located at the checkout station and thereby storing product at the checkout station; and automatically adding a cost of the dispensed product to the cost for the scanned items.

Independent Claim 49 is directed to a method of operating a checkout station comprising: employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items; prompting a consumer to purchase a product from a dispensing device; automatically dispensing the product from the dispensing device upon the consumer's request; and automatically adding a cost of the product to the cost for the purchasable items (page 6, lines 17-21).

Independent Claim 50 is directed to a method for providing a point of purchase product without the need for a cashier comprising: providing a checkout area for the consumer to bring items for purchase; accumulating a cost associated with the items the consumer wants; providing a product at the point of purchase; prompting the consumer that other product is available at the point of purchase; dispensing the product to the consumer at the point of purchase upon a request by the consumer to purchase the product; and automatically, without need for a cashier, adding to the cost associated with other items purchased any additional cost for the product (page 6, lines 22-28).

Independent Claim 56 is directed to a method for providing different products at a point-of purchase comprising: stocking a plurality of different products at the point of purchase; automatically prompting the consumer that the products are available at the point of purchase; automatically accepting an approval by the consumer to purchase at least one of the products; automatically dispensing the at least one the product to the consumer at the point of purchase; and automatically adding to the cost of the product to the cost of any other items that are being purchased.

Independent Claim 60 is directed to a method for providing consumable and non-consumable products at the same location comprising: stocking consumable and non-consumable products in a single device; allowing a consumer to purchase a consumable product from the single device without the need for a cashier; allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier; dispensing the

consumable and non-consumable product to the consumer at the same location in the device; and allowing the consumer to pay for the consumable and non-consumable product without the need for money.

Independent Claim 62 is directed to a method of generating revenue comprising: providing a point of purchase device that is coupled to the retail purchasing device, the point of purchase device designed to dispense a product at the point of purchase; and obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device.

Independent Claim 65 is directed to a method for purchasing items comprising the steps of transporting a plurality of items to a checkout station; using a device that identifies costs for the items to create a purchase price for the plurality of items; prompting a consumer to purchase a point of purchase product; dispensing from a dispenser the point of purchase product; and automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price.

Independent Claim 76 is directed to a method for dispensing a point of purchase product comprising the steps of: providing a purchasable item and a point of purchase product for sale to a retail customer; storing the point of purchase product at a point of purchase location for the purchasable item; inputting a customer selection for the point of purchase product to a retail customer terminal proximate the point of purchase location for the purchasable item, the retail customer terminal adapted to process the customer selection for the point of purchase product and a customer selection for the purchasable item; processing the customer selection for the point of purchase product for electrical communication with a point of purchase dispenser proximate the point of purchase location for the purchasable item; and dispensing the point of purchase product to the customer from the point of purchase dispenser responsive to the electrical communication and adding a cost of the point of purchase product to a purchasable item cost automatically.

Independent Claim 102 is directed to a method of operating an automated checkout comprising: allowing a consumer to bring purchasable items to an automated checkout device; allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display; allowing the consumer to select, by touching the display, a product from a dispensing device that stores and dispenses product at a location that is in juxtaposition to an area

that a consumer occupies as he operates the automated checkout; automatically dispensing the product from the dispensing device in response to the consumer touching the display; and automatically including, without the need for a cashier, a cost of the product with the cost for the scanned items on the display in response to the consumer touching the display.

Independent Claim 106 is directed to a method of operating a checkout station comprising: allowing a consumer to bring purchasable items to a store operator; allowing the operator to scan the purchasable items and accumulate a cost for the scanned items; storing a plurality of point of purchase products in a dispenser at the checkout station; providing a screen that has a dynamic display capable of displaying an advertisement for at least one of the plurality of point of purchase products; allowing the consumer to purchase the point of purchase product by touching the screen; dispensing the product from the dispensing device in response to the consumer touching the screen; and automatically including and adding a cost of the dispensed product to the cost for the scanned items in response to the consumer touching the screen without any other action by the consumer or the operator.

Independent Claim 107 is directed to a method of operating a checkout station comprising: employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items; prompting a consumer, through the use of a display, to purchase a plurality of different products from a dispensing device; allowing the consumer to select at least one of the plurality of products by touching a portion of the checkout station; automatically dispensing the product from the dispensing device upon the consumer's touching of a portion of the checkout station; and automatically adding, without any action of the operator, a cost of the product to the cost for the purchasable items in response to the consumer touching a portion of the checkout station.

Independent Claim 108 is directed to a method for providing a chewing gum product to a consumer at a checkout area comprising: providing a checkout area that allows a consumer to checkout without the need for a cashier; providing an area for allowing a consumer to bring items the consumer wants to purchase; accumulating a cost associated with the items the consumer wants to purchase; storing a chewing gum product at the point of purchase in a dispenser; prompting the consumer that the chewing gum product is available at the point of purchase; dispensing the chewing gum product to the consumer at the point of purchase in response to the consumer touching a screen; and automatically, without the need for a cashier,

adding a cost associated with chewing gum purchased to the cost associated with the items in response to the consumer touching the screen.

Independent Claim 109 is directed to a method for providing different products including confectionary products at a point of purchase comprising: stocking a plurality of different confectionary products at the point of purchase; automatically prompting, through the use of a dynamic display, the consumer that the confectionary products are available at the point of purchase; allowing the consumer to select, through the use of the dynamic display, at least one confectionary product to purchase; automatically dispensing the at least one the confectionary product to the consumer at the point of purchase in response to the consumer touching the dynamic display; and automatically adding to the cost of the product to the cost of any other items that are being purchased in response to the consumer touching the dynamic display.

Independent Claim 110 is directed to a method for providing confectionary and non-consumable products at the same location comprising: stocking confectionary and non-consumable products in a single device; allowing a consumer to purchase a confectionary product from the single device without the need for a cashier; allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier; dispensing the confectionary and non-consumable product to the consumer at the same location; totaling the cost for the confectionary and non-consumable product; and allowing the consumer to pay for the confectionary and non-consumable product without the need for money.

Independent Claim 111 is directed to a method for purchasing items comprising the steps of transporting a plurality of items to a checkout station; using a means for identifying costs to identify the costs for the items and create a purchase price for the plurality of items; providing a means for prompting the purchase of point of purchase products; prompting through the use of the means for prompting the purchase a consumer to purchase at least one of a group of point of purchase products; allowing the consumer to use the means for prompting the purchase to select one of the group of point of purchase products; dispensing from a means for dispensing the point of purchase product; and automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price.

C. THE REJECTION OF CLAIMS 62-64 UNDER 35 U.S.C. §102(b) SHOULD BE REVERSED BECAUSE THE CITED REFERENCE DOES NOT ANTICIPATE THE CLAIMED INVENTION

In the Office Action dated March 27, 2007 (“Office Action”), the Examiner alleged that *Terranova* discloses every element of present Claims 62-64. However, Appellants respectfully submit that *Terranova* fails to disclose each and every element of Claims 62-64 and that the anticipation rejection in view of *Terranova* is improper and based on a misunderstanding of the present claims.

Independent Claim 62 recites, in part, a method of generating revenue comprising providing a point of purchase device that is coupled to the retail purchasing device, the point of purchase device designed to dispense a product at the point of purchase and obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device. See, specification, page 38, lines 3-13. In this manner, for example, a retail outlet may recoup some of the out-of-pocket costs for use of a point of purchase device. This method, then, helps fund the use of the devices by the retail outlets. See, specification, page 38, lines 3-4.

In contrast, *Terranova* fails to disclose or suggest every element of independent Claim 62. For example, *Terranova* fails to disclose or suggest obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device, as required, in part, by Claim 62. Instead, *Terranova* is entirely directed to a fuel dispensing system for setting transaction parameters in association with a remote communications unit. See, *Terranova*, Abstract. As noted by the Examiner, *Terranova* merely discloses the possibility that the fuel dispenser be associated with a quick serve restaurant (QSR). See, Office Action, page 2, lines 17-22. *Terranova* does not disclose that a product supplier pay a fee in exchange for allowing a product to be dispensed from the point of purchase device in accordance with Claim 62.

The Examiner asserts that it is inherent in *Terranova* that the owner of *Terranova*’s gas station would obtain a fee in the form of profits for selling a particular item through *Terranova*’s system. See, Office Action, page 2, lines 17-22. However, Appellants respectfully submit that the claimed step of obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device, as required by Claim 62, is not the

same as obtaining profits for selling a particular item, as allegedly required in *Terranova*. Rather, a *quid pro quo* for some third party for putting the product in the point of purchase device is providing a fee. As discussed herein above, this is a method for funding the point of purchase device in a retail outlet. This is not disclosed nor suggested nor inherent in *Terranova*. Indeed, the Patent Office's rationale for the rejection demonstrates the rejection is improper.

For at least the reasons discussed above, *Terranova* fails to teach, suggest, or even disclose independent Claim 62 and Claims 63-64 that depend from Claim 62, and thus, fails to anticipate the present claims. Accordingly, Appellants respectfully request that Claims 62-64 are in condition for allowance.

D. THE REJECTION OF CLAIMS 44-68, 76 AND 102-111 UNDER 35 U.S.C. §103(a) SHOULD BE REVERSED BECAUSE THE CITED REFERENCES ARE NOT COMBINABLE AND, EVEN IF COMBINABLE, FAIL TO DISCLOSE OR SUGGEST ALL THE ELEMENTS OF THE CLAIMS

Appellants respectfully submit that the obviousness rejection of Claims 44-68, 76 and 102-111 should be reversed because the Patent Office fails to establish a *prima facie* case of obviousness. In the Office Action, the Examiner alleged that the combination of *Bustos* in view of *Walter* and further in view of *Terranova* renders the claimed subject matter obvious. However, the Examiner fails to establish a *prima facie* case of obviousness in each rejection because there exists no reason that the skilled artisan would have combined the cited references to arrive at the presently claimed subject matter. Moreover, the cited references fail to teach or suggest every element of the claimed invention. Further, in many instances, the Patent Office has not even attempted to provide specific support from the cited references for many novel elements of the claimed invention.

1. The skilled artisan would not combine *Bustos*, *Walter* and *Terranova*

The skilled artisan would have no reason to combine or modify the cited references because *Bustos* teaches away from the claimed invention and there exists no reason for the skilled artisan to combine the references. The principal reference relied upon by the Examiner is *Bustos*. This reference entirely relates to a product vending system utilizing a pneumatic product delivery. In this regard, as illustrated in Figure 1, the product to be dispensed is stored at a

remote location away from the actual dispensing device, which teaches away from the claimed invention. For example, *Bustos* specifically states:

A primary object of the present invention is providing a method and system for merchandising products to customer's situations and at locations where it has previously been inconvenient or expensive to do so. It is a particular object of the present invention to vend food and other products to consumers at locations at which it may be impractical to store the products and to do so in a way that minimizes the amount of human labor required to sell and deliver the product to the customer.

Bustos, column 3, lines 43-52. *Bustos* actually teaches one having ordinary skill in the art away from the claimed invention. First, the whole point of *Bustos* is to store product remote from the dispensing device, checkout counter or similar area. This is to save space or because the product needs to be maintained at temperatures other than ambient temperatures. Thus, in contrast to the claimed invention, *Bustos* does not envision storing products proximate to the point of purchase but rather remote thereto. As a result, *Bustos* does not suggest this claimed element as it teaches away from same. Thus, the Examiner's alleged modification of *Bustos*, *Walter* and *Terranova* would prevent the *Bustos* apparatus from operating as intended. Consequently, the skilled artisan would have no reason to combine *Bustos*, *Walter* and *Terranova*. *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984) (If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no motivation to make the proposed modification).

Moreover, *Bustos* is not concerned with the problem solved by Appellants' claimed invention. *Bustos* illustrates the supermarket prior to the advent of automated or self-scan checkouts. Therefore, *Bustos* is not concerned with providing a method for allowing point-of-purchase products to be dispensed and stored at self-scanning or other self-checkout counters to overcome the problems of limited shelf space for point-of-purchase products. Instead, point-of-purchase products are displayed in *Bustos* as they were prior to self-checkout devices. Consumers can peruse these displays while they wait for the clerk to check them out. Consequently, the issues facing Appellants were not a concern to *Bustos*. It is erroneous to utilize Appellants' recognition of a problem and its solution as a template to recreate the claimed invention. *Monarch Knitting Machinery Corp. v. Fukuhara Industrial Trading Comp., Ltd.*, 139 F.3d 1009 (Fed. Cir. 1998).

2. *Bustos*, *Walter* and *Terranova*, alone, or in combination, fail to disclose or suggest a number of claimed features

a. Independent Claim 44

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 44, for example, requires allowing the consumer to select a product from a dispensing device located in juxtaposition to the automated checkout. The product is not only dispensed at a location in juxtaposition to the automated checkout, it is also stored there. *Bustos* fails to disclose or suggest this feature and, in fact, teaches away from this concept in that it requires remote storage of the products away from the actual dispenser. See, *Bustos*, column 3, lines 43-65.

Regarding the Examiner's statement that "remote" and "proximate" are relative terms, Appellants submit that this is inapposite. They are antonyms. "Remote" is the word used by *Bustos*. It is the exact opposite of "proximate" and "juxtaposition." For the Examiner to disregard this distinction is to effectively destroy the ability of Appellants to even attempt to claim the method of Claim 44. Appellants respectfully submit that the Examiner's justification for the rejection demonstrates that it is not proper. Moreover, *Walter* also fails to disclose any kind of dispensing device whatsoever.

Claim 44 also requires, in part, the step of automatically adding a cost of the product to the cost associated with the scanned items. Neither *Bustos* nor *Walter* discloses this feature. Indeed, *Bustos* fails to disclose or even suggest a scanning device or the use of one in conjunction with its devices. *Terranova* has been added by the Examiner as teaching adding the cost of the dispensed product to the total cost. However, *Terranova* also stores the product remotely, thus teaching away from the presently claimed subject matter. Specifically, *Terranova* states that "[t]he present invention uses transponders to appropriately associate orders placed at different locations with the appropriate customer at a common pick-up location." *Terranova*, col. 11, lines 64-67. In sum, the cited references not only fail to disclose at least one claimed element when combined, they teach away from same. For these reasons, Appellants respectfully submit that the obviousness rejection of Claim 44 is improper.

b. Independent Claim 48

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 48 requires, in part, a touch screen coupled to the dispensing device. *Bustos* fails to disclose or suggest any touch screen associated with a dispensing device. *Walter* fails to disclose any kind of product dispensing device whatsoever. *Terranova* does not disclose a touch screen and instead discloses a key pad. See, *Terranova*, col. 7, lines 23-29. Specifically, *Terranova* states that “[t]he graphics display 100 will have an associated keypad 102 adjacent to the display or integrated with the display to provide a touch interface . . .” Appellants do not believe that this is a touch screen that can change and provide a variety of messages and prompts.

Claim 48 also requires, in part, the element of storing the dispensed product at the point of purchase, which is taught away from by *Bustos* and is not disclosed or suggested by *Walter*. *Terranova* does not remedy this defect and, if anything, teaches away from this claim element. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 48 is improper.

c. Independent Claim 49

The cited references alone, or in combination, fail to disclose or suggest the present claim. In addition to the automatically adding the cost of the product (not disclosed in *Bustos* or *Walter*), independent Claim 49 requires prompting the consumer to purchase a product from the dispensing device. Neither *Bustos*, *Walter* nor *Terranova* disclose or suggest this feature. With respect to *Walter*, it should be noted that to the extent it prompts the consumer to purchase any product, that product is not located at the point of purchase. Indeed, *Walter* discloses the problem Appellants’ claimed invention attempts to overcome, namely the fact that point of purchase products are not provided at automated checkout counters. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 49 is improper.

d. Independent Claim 50

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 50 requires, in part, providing a product at the point of purchase and prompting the consumer that other products are available at the point of purchase. These elements are neither disclosed nor suggested by *Bustos*, *Walter* or *Terranova*. In fact, *Bustos* and *Walter* fail to disclose or suggest any prompting of a consumer to purchase products from a dispensing device. Although the Examiner states that *Terranova* discloses this feature, the disclosure cited by the Examiner merely states that the display can “provide advertising,

merchandising and multimedia presentations to a customer in addition to basic transaction functions.” See, *Terranova*, col. 8, line 67-col. 9, line 2.

Furthermore, independent Claim 50 requires, in part, storing the point of purchase product at the point of purchase. *Bustos* and *Walter* fails to disclose or suggest, and indeed teach away from, same. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 50 is improper.

e. Independent Claim 56

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 56 requires, in part, stocking a plurality of different products at the point of purchase. This feature is neither disclosed nor suggested by *Bustos*, *Walter* or *Terranova*, and is actually taught away from in *Bustos* and *Terranova*. Additionally, for example, the feature of automatically prompting the consumer that the products are available at the point of purchase is not even addressed by the Office Action. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 56 is improper.

f. Independent Claim 65

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 65 requires, in part, prompting a consumer to purchase a point of purchase product that is stored in the dispenser. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest this feature. As discussed previously, with respect to *Walter* and *Terranova*, it should be noted that to the extent a device prompts the consumer to purchase any product, that product is not located at the point of purchase. Thus, for at least this reason, Appellants respectfully submit that the obviousness rejection of Claim 65 is improper.

g. Independent Claim 76

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 76 requires, in part, storing point of purchase products at the point of purchase location. This feature is neither disclosed nor suggested by *Bustos*, *Walter* or *Terranova*, and is actually taught away from in *Bustos* and *Terranova*. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 76 is improper.

h. Independent Claim 102

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 102 requires, in part, allowing the consumer to select, by touching the

display, a product from a dispensing device that stores and dispenses the product. *Bustos* fails to disclose or suggest any touch display associated with a dispensing device. *Terranova* appears to use a keypad, not a touch screen. See, *Terranova*, col. 8, lines 64. *Walter* fails to disclose any kind of product dispensing device whatsoever. Claim 102 also requires, in part, that the product to be dispensed is stored at a location that is in juxtaposition to an area that a consumer occupies as he operates the automated checkout, which is not disclosed or suggested by *Bustos*, *Walter* or *Terranova*. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 102 is improper.

i. Independent Claim 106

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 106 requires, in part, providing a screen that has a dynamic display capable of displaying an advertisement for at least one of a plurality of point of purchase products. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any dynamic display advertisements associated with the screen and products of a point of purchase device. Claim 106 also requires, in part, allowing the consumer to purchase the point of purchase product by touching a screen. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any touch screen associated with a point of purchase device. Claim 106 also requires, in part, storing the products in a dispenser at the checkout station, which is not disclosed or suggested by *Bustos*, *Walter* or *Terranova*. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 106 is improper.

j. Independent Claim 107

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 107 requires, in part, prompting a consumer through the use of a display to purchase a plurality of different products from a dispensing device. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any prompting by a dispensing device. Claim 107 also requires, in part, allowing the consumer to select one of the plurality of product from a dispensing device by touching a portion of a checkout station. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest this feature. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 107 is improper.

k. Independent Claim 108

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 108 requires, in part, prompting a consumer to purchase a chewing gum from a dispenser. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any prompting by a dispenser or even any chewing gum product dispensed by a dispenser. Claim 108 also requires, in part, dispensing the chewing gum product to the consumer in response to the consumer touching a screen. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest this feature. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 108 is improper.

l. Independent Claim 109

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 109 requires, in part, stocking a plurality of different confectionary products at the point of purchase. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest this feature, and *Bustos* and *Terranova* actually teach away from same. Claim 109 requires, in part, automatic prompting a consumer, through the use of a dynamic display, to purchase the plurality of confectionary products from a dispensing device. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any automatic prompting by a dispensing device. Claim 109 also requires, in part, allowing the consumer to select at least one of the confectionary products from a dispensing device by touching the dynamic display. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest this feature. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 109 is improper.

m. Independent Claim 110

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 110 requires, in part, stocking confectionary and non-consumable products in a single dispensing device. *Bustos*, *Walter* and *Terranova* fail to disclose or even suggest this feature. Claim 110 requires, in part, allowing a consumer to purchase the confectionary product or non-consumable product from the dispensing device without the need of a cashier. *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any such automatic confectionary product and non-consumable product dispensing device. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 110 is improper.

n. Independent Claim 111

The cited references alone, or in combination, fail to disclose or suggest the present claim. Independent Claim 111 requires, in part, providing a means for prompting the purchase of point of purchase products. These elements are neither disclosed nor suggested by *Bustos*, *Walter* or *Terranova*. In fact, *Bustos*, *Walter* and *Terranova* fail to disclose or suggest any prompting means of a consumer to purchase products from a dispensing device. For at least these reasons, Appellants respectfully submit that the obviousness rejection of Claim 111 is improper.

VIII. CONCLUSION

Appellants respectfully submit that the Office Action has failed to establish anticipation under 35 U.S.C. §102 with respect to the rejections of Claims 62-64 and a *prima facie* case of obviousness under 35 U.S.C. §103 with respect to the rejection of Claims 44-68, 76 and 102-111. Accordingly, Appellants respectfully submit that the anticipation and obviousness rejections are erroneous in law and in fact and should therefore be reversed by this Board.

The Director is authorized to charge \$500.00 for the Appeal Brief and any additional fees which may be required, or to credit any overpayment to Deposit Account No. 02-1818. If such a withdrawal is made, please indicate the Attorney Docket No. 112703-294 on the account statement.

Respectfully submitted,

BELL, BOYD & LLOYD LLC

BY 

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Dated: July 12, 2007

CLAIMS APPENDIX
PENDING CLAIMS ON APPEAL OF
U.S. PATENT APPLICATION SERIAL NO. 10/691,806

44. A method of operating an automated checkout comprising:
allowing a consumer to bring purchasable items to an automated checkout device;
allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display;
allowing the consumer to select a product from a dispensing device located in juxtaposition to the automated checkout;
storing the product to be dispensed in the dispensing device,
automatically dispensing the product from the dispensing device in response to the consumer's selection; and
automatically adding a cost of the product to the cost for the scanned items on the display.

45. The method of Claim 44, wherein the consumer selects the product by using a touch screen.

46. The method of Claim 44, including the step of allowing the consumer to pay for the product by credit/debit card.

47. The method of Claim 44, wherein adding the cost of the product includes automatically increasing a balance due on a credit/debit card transaction.

48. A method of operating a checkout station comprising:
allowing a consumer to bring purchasable items to a store operator;
allowing the operator to scan the purchasable items and accumulate a cost for the scanned items;
allowing the consumer to independently purchase a product by touching a screen coupled to a dispensing device;
dispensing the product from the dispensing device in response to the consumer touching the screen, the dispensing device being located at the checkout station and thereby storing product at the checkout station; and
automatically adding a cost of the dispensed product to the cost for the scanned items.

49. A method of operating a checkout station comprising:
employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items;
prompting a consumer to purchase a product from a dispensing device, the product being stored in the device that is located at the checkout stand;
automatically dispensing the product from the dispensing device upon the consumer's request; and
automatically adding a cost of the product to the cost for the purchasable items.

50. A method for providing a point of purchase product without the need for a cashier comprising:

- providing a checkout area for the consumer to bring items for purchase;
- accumulating a cost associated with the items the consumer wants;
- storing a product at the point of purchase;
- prompting the consumer that the product is available at the point of purchase;
- dispensing the product to the consumer at the point of purchase upon a request by the consumer to purchase the product; and

automatically, without need for a cashier, adding to the cost associated with other items purchased any additional cost for the product.

51. The method of Claim 50, which includes accepting a single payment in exchange for the product and other purchased items.

52. The method of Claim 50, wherein the consumer is prompted that the product is available by an advertisement for the product.

53. The method of Claim 50, wherein prompting the consumer includes prompting the consumer at a time selected from the group consisting of: before the consumer purchases the other consumable items, while the consumer is purchasing the other items and after the consumer purchases the other items.

54. The method of Claim 50, which includes allowing a retail operator to enter the consumer's approval to purchase the product.

55. The method of Claim 50, which includes allowing the consumer to enter the approval to purchase the product.

56. A method for providing different products at a point-of purchase comprising:
stocking a plurality of different products at the point of purchase;
automatically prompting the consumer that the products are available at the point of purchase;
automatically accepting an approval by the consumer to purchase at least one of the products;
automatically dispensing the at least one the product to the consumer at the point of purchase; and
automatically adding to the cost of the product to the cost of any other items that are being purchased.

57. The method of Claim 56, wherein prompting the consumer that the products are available includes displaying a dynamic display selected from the group consisting of: a display of the products, a message concerning the products, an advertisement concerning the products and a price reduction concerning the products.

58. The method of Claim 56, which includes allowing a retail operator to enter the consumer's approval to purchase the at least one product.

59. The method of Claim 56, which includes allowing the consumer to enter the approval to purchase the at least one product.

60. A method for providing consumable and non-consumable products at the same location comprising:

stocking consumable and non-consumable products in a single device;

allowing a consumer to purchase a consumable product from the single device without the need for a cashier;

allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier;

dispensing the consumable and non-consumable product to the consumer at the same location in the device; and

allowing the consumer to pay for the consumable and non-consumable product without the need for money.

61. The method of Claim 60, which includes allowing the consumer to pay for the consumable and non-consumable product at one time.

62. A method of generating revenue comprising:

providing a point of purchase device that is coupled to the retail purchasing device, the point of purchase device designed to dispense a product at the point of purchase; and

obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed from the point of purchase device.

63. The method of Claim 62, wherein the point of purchase device is integral with the retail purchasing device.

64. The method of Claim 62, wherein the retail purchasing device is selected from the group consisting of: a self-scanning purchasing device, a fuel dispensing gasoline pump, a debit/credit card reader and a cash register.

65. A method for purchasing items comprising the steps of:
transporting a plurality of items to a checkout station;
using a device that identifies costs for the items to create a purchase price for the plurality of items;
prompting a consumer to purchase a point of purchase product that is stored in the dispenser;
dispensing from a dispenser located at the checkout station the point of purchase product;
and
automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price.

66. The method of Claim 65, wherein the cost of the point of purchase product is added to the purchase price before the cost of all of the plurality of items is totaled.

67. The method of Claim 65, wherein the device that identifies costs is an optical scanner.

68. The method of Claim 65, wherein the point of purchase product is dispensed from a device that is integral with the device that identifies costs.

76. A method for dispensing a point of purchase product comprising the steps of:
providing a purchasable item and a point of purchase product for sale to a retail customer;
storing the point of purchase product at a point of purchase location for the purchasable item;

inputting a customer selection for the point of purchase product to a retail customer terminal proximate the point of purchase location for the purchasable item, the retail customer terminal adapted to process the customer selection for the point of purchase product and a customer selection for the purchasable item;

processing the customer selection for the point of purchase product for electrical communication with a point of purchase dispenser proximate the point of purchase location for the purchasable item; and

dispensing the point of purchase product to the customer from the point of purchase dispenser responsive to the electrical communication and adding a cost of the point of purchase product to a purchasable item cost automatically.

102. A method of operating an automated checkout comprising:
allowing a consumer to bring purchasable items to an automated checkout device;
allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display;

allowing the consumer to select, by touching the display, a product from a dispensing device that stores and dispenses product at a location that is in juxtaposition to an area that a consumer occupies as he operates the automated checkout;

automatically dispensing the product from the dispensing device in response to the consumer touching the display; and

automatically including, without the need for a cashier, a cost of the product with the cost for the scanned items on the display in response to the consumer touching the display.

103. The method of Claim 102, wherein the dispensing device is part of the automated checkout.

104. The method of Claim 102, including the step of allowing the consumer to pay for the product by credit/debit card.

105. The method of Claim 102, wherein the dispensing device is integral with the automated checkout.

106. A method of operating a checkout station comprising:
allowing a consumer to bring purchasable items to a store operator;
allowing the operator to scan the purchasable items and accumulate a cost for the scanned items;
storing a plurality of point of purchase products in a dispenser at the checkout station;
providing a screen that has a dynamic display capable of displaying an advertisement for at least one of the plurality of point of purchase products;
allowing the consumer to purchase the point of purchase product by touching the screen;
dispensing the product from the dispensing device in response to the consumer touching the screen; and
automatically including and adding a cost of the dispensed product to the cost for the scanned items in response to the consumer touching the screen without any other action by the consumer or the operator.

107. A method of operating a checkout station comprising:

employing an operator to input purchasable items into a device and accumulate a cost for the purchasable items;

prompting a consumer, through the use of a display, to purchase a plurality of different products from a dispensing device;

allowing the consumer to select at least one of the plurality of products by touching a portion of the checkout station;

automatically dispensing the product from the dispensing device upon the consumer's touching of a portion of the checkout station; and

automatically adding, without any action of the operator, a cost of the product to the cost for the purchasable items in response to the consumer touching a portion of the checkout station.

108. A method for providing a chewing gum product to a consumer at a checkout area comprising:

providing a checkout area that allows a consumer to checkout without the need for a cashier;

providing an area for allowing a consumer to bring items the consumer wants to purchase;

accumulating a cost associated with the items the consumer wants to purchase;

storing a chewing gum product at the point of purchase in a dispenser;

prompting the consumer that the chewing gum product is available at the point of purchase;

dispensing the chewing gum product to the consumer at the point of purchase in response to the consumer touching a screen; and

automatically, without the need for a cashier, adding a cost associated with chewing gum purchased to the cost associated with the items in response to the consumer touching the screen.

109. A method for providing different products including confectionary products at a point of purchase comprising:

- stocking a plurality of different confectionary products at the point of purchase;
- automatically prompting, through the use of a dynamic display, the consumer that the confectionary products are available at the point of purchase;
- allowing the consumer to select, through the use of the dynamic display, at least one confectionary product to purchase;
- automatically dispensing the at least one the confectionary product to the consumer at the point of purchase in response to the consumer touching the dynamic display; and
- automatically adding to the cost of the product to the cost of any other items that are being purchased in response to the consumer touching the dynamic display.

110. A method for providing confectionary and non-consumable products at the same location comprising:

- stocking confectionary and non-consumable products in a single device;
- allowing a consumer to purchase a confectionary product from the single device without the need for a cashier;
- allowing the consumer to purchase a non-consumable product from the single device without the need for a cashier;
- dispensing the confectionary and non-consumable product to the consumer at the same location;
- totaling the cost for the confectionary and non-consumable product; and
- allowing the consumer to pay for the confectionary and non-consumable product without the need for money.

111. A method for purchasing items comprising the steps of:
transporting a plurality of items to a checkout station;
using a means for identifying costs to identify the costs for the items and create a purchase price for the plurality of items;
providing a means for prompting the purchase of point of purchase products;
prompting through the use of the means for prompting the purchase a consumer to purchase at least one of a group of point of purchase products;
allowing the consumer to use the means for prompting the purchase to select one of the group of point of purchase products;
dispensing from a means for dispensing the point of purchase product; and
automatically, without the need for a human operator, adding the cost of the point of purchase product to the purchase price.

EVIDENCE APPENDIX

EXHIBIT A: Office Action dated March 27, 2007

EXHIBIT B: U.S. Patent No. 6,882,900 to Terranova ("*Terranova*"), cited by the Examiner in the Office Action dated March 27, 2007

EXHIBIT C: U.S. Patent No. 5,816,443 to Bustos ("*Bustos*"), cited by the Examiner in the Office Action dated March 27, 2007

EXHIBIT D: U.S. Patent No. 5,992,570 to Walter et al. ("*Walter*"), cited by the Examiner in the Office Action dated March 27, 2007

EXHIBIT A



UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,806	10/21/2003	Steven P. Barton	112703-294	6662
29156 7590 03/27/2007 BELL, BOYD & LLOYD LLP P.O. Box 1135 CHICAGO, IL 60690				
References Downloaded			EXAMINER	
			SHAPIRO, JEFFERY A	
			ART UNIT	PAPER NUMBER
			3653	112703-294
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		03/27/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

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BELL, BOYD & LLOYD
INTELLECTUAL PROPERTY DOCKET

APR 02 2007

ATTY: *hmb-pmc*

DOCKET #: *112703-294*

0294

Office Action Summary

Application No.

10/691,806

Applicant(s)

BARTON ET AL.

Examiner

Jeffrey A. Shapiro

Art Unit

3653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 44-68,76 and 102-111 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 44-68,76 and 102-111 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/16/07.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 62-64 is rejected under 35 U.S.C. 102(e) as being anticipated by Terranova (US 6,882,900 B1).

Terranova discloses a point of purchase device (18) in the form of a fuel dispenser that is coupled with a retail purchasing device in the form of quick serve (QSR) menu, as discussed at col. 11, lines 25-35. Regarding obtaining a fee paid from a supplier of the product in exchange for allowing the product to be dispensed, note that it is considered to be inherent that the franchisor in contract with the owner/franchisee of Terranova's gas station would obtain a fee in the form of profits for the owner selling a particular item through Terranova's system, as this is how the current gasoline distribution system operates—i.e., Exxonmobile corporate charges the local operator of the gas station a fee for the gasoline he receives from the refinery for sale at the station. Fees are also paid for use of signs, equipment, and the like. At the least, this is substantially the same structure as Applicant's limitations regarding obtaining fees for

Art Unit: 3653

use of vending equipment. Note also the prevalence of usage fees paid to owners of equipment or for use of content in a licensing situation.

Regarding Claim 63, note that the entire point of purchase device is disclosed as being "integral" with the resale purchasing device since the QSR menu is displayed on the fuel dispenser display. See again, col. 11, lines 25-35.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 44-68, 76 and 102-111 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bustos (US 5,816,443) in view of Walter et al (US 5,992,570) and further in view of Terranova (US 6,882,900 B1). Bustos discloses the following.

As described in Claims 44, 48-50, 56, 62-65, 67, 76 and 102-111;

- a. allowing a consumer to bring purchasable items to a checkout device (see Bustos, fig. 5a);
- b. scanning the items and accumulating a cost for the scanned items on a display (127), as illustrated in Bustos, fig. 1, and fig. 5a, which illustrates a clerk scanning items, and figure 5d, which illustrates a monitor (106);

- c. allowing the consumer to select a product (47b) from a dispensing device (20b) located in juxtaposition to the automated checkout (see Bustos, fig. 5a);
- d. automatically dispensing the product from the dispensing device in response to the consumer's selection (see Bustos, fig 5a); and
- e. adding a cost of individual items to the total cost for the scanned items on the display (see Bustos, col. 8, lines 1-49);

Bustos does not expressly disclose, but Walter discloses the following.

As described in Claims 44, 48-50, 56, 62-65, 67, 68, 76 and 102-111;

- f. allowing a consumer to bring purchasable items to an *automated* checkout device (10) (see Walter, col. 2, lines 15-19, for example);
- gi. allowing the consumer to scan the purchasable items and accumulate a cost for the scanned items on a display; (see Walter, Claim 8, for example);
- gii. (68) the point of purchase dispenser is integral with the device that identifies costs-note that Walter discloses scanner (16);

Bustos does not expressly disclose, but Terranova discloses the following.

As described in Claims 44, 47-51, 56, 60-66, 76 and 102-111;

Art Unit: 3653

ei. automatically adding a cost of the dispensed product to the total cost of the scanned items on the display.

eii. accepting a single payment for all items, including the dispensed product;

See Terranova, col. 8, line 64-col. 9, line 19 and col. 11, lines 25-35.

As described in Claim 45, 48;

h. use of a touch screen as the display (100);

See Terranova, col. 1, lines 17-20 and col. 7, lines 23-29.

As described in Claims 46 and 104;

i. allowing the customer to pay for the product using a credit/debit card or cash;

See Terranova, col. 1, lines 47-50.

As described in Claims 49, 50, 52, 53, 56, 57, 65

j. advertising/prompting a customer to add a dispensable product to their purchase;

See Terranova, col. 8, line 64-col. 9, line 19.

Regarding Claim 53, note that Terranova discloses advertising, but does not specify the time period at which it is presented. However, note that the group of time periods presented in Claim 53 covers all conceivable time periods with respect to the transaction. Therefore, since Terranova discloses presenting advertisements with respect to the transactions, Terranova is considered to meet Claim 53.

Art Unit: 3653

Further regarding Claims 54, 55, 58, 59 and 106, note that it would have been obvious for either an operator to substitute for a customer in operating the machine, taking verbal instruction from said customer, or for the customer himself to perform the task.

Regarding Claim 60, note that Terranova discloses purchasing items at a convenience store, which is considered to include both consumables, such as food, as well as non-consumables, such as lighters and windshield scrapers. Note also that a food item that is not consumed, becomes a non-consumable item.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to have replaced the checkout counter of Bustos with the checkout counter of Walker.

The suggestion/motivation would have been to speed customer throughput by speeding up the checkout process. See Walter, col. 2, lines 15-19.

Further, at the time of the invention, it would have been obvious to one of ordinary skill in the art to have incorporated the interface having the features discussed above, as taught by Terranova, in Bustos' checkout counter with dispenser, so that a customer using Bustos' self-checkout would be able to dispense an item, the cost of which was automatically added to the total of all items purchased at the checkout counter.

Art Unit: 3653

The suggestion/motivation would have been to speed customer throughput by speeding up the checkout process. See Walter, col. 2, lines 15-19.

Note also that Bustos provides motivation and teaching for locating an item dispenser at a checkout counter/point of sale (POS).

Walter provides teaching to use a self checkout system in place of a traditional checkout counter with clerk/operator.

Terranova discloses an interface for a customer operated point of sale device which promotes and allows the customer to purchase other items/services at the single POS device.

Based on these teachings, one ordinarily skilled in the art would have found it obvious to incorporate Bustos' dispenser and checkout counter as a self-checkout counter having a display which displays a user interface allowing purchase of the dispensed items during the purchase transaction of other items that have been scanned.

Therefore, the combination of Bustos, Walter and Terranova are considered to read on Applicant's claims as discussed above.

Response to Arguments

5. Applicant's arguments filed 3/7/07 have been fully considered but they are not persuasive.

Regarding Claim 44, Applicant argues that Bustos teach away from an automated checkout with the product located/stored and dispensed in juxtaposition to

Art Unit: 3653

the checkout itself. Applicant's newly added claim limitations simply state "storing the product to be dispensed in the dispensing device". Bustos' storage area is connected by pipe to the outlet from which the item is delivered to the customer. This structure is all considered part of the dispenser. Therefore, Applicant's newly added claim language is considered to be met by Bustos. The same is true of Terranova.

Again, regarding the terms "remote" and "proximate", these terms are relative terms. In relation to Bustos or Terranova, the items located in the storage areas are construed to be proximate since they are in the same building, in Bustos case, and proximate the fuel pumps in Terranova's case. Either way, even if it was construed that they were not proximate, it would have been obvious to do so since the size of the conduit through which the items travel is a matter of design choice based on situational requirements. Terranova still teaches the concept of adding the cost of the dispensed product to the total cost of the customer's bill.

Regarding Claims 48, 102, and 106-111, Terranova does disclose use of a touch screen. Applicant appears to misread the passage at col. 7, lines 23-29. A key pad is well-known to be a set of keys in the form of a keyboard. A touch interface, however, can only be integrated with the display to form a touch interface in the implementation of a touch screen. This is also considered the more likely interpretation since the passage previously mentions the keyboard/keypad as adjacent to the display. Additionally, Terranova at col. 1, lines 17-20 refers to "user interfaces with large displays and touch-pads or screens" as being typical in fuel dispensers, which further buttresses the

Art Unit: 3653

interpretation of Terranova's touch screen interface to be a touch screen as called for in Applicant's claims.

Regarding Claim 49, Walter, as admitted by Applicants, does disclose a customer prompt. Since this is in part what the teaching of Walter is used for, the fact that it prompts for any product can be construed to include products located anywhere in the store, either at the point of purchase or far away therefrom.

Regarding Claim 50, Terranova, at col. 8, line 64-col. 9, line 8, discloses a prompt for items able to be dispensed at the fuel dispenser. The media presentations and displays described by Terranova are considered to meet the limitations of a means to prompt the consumer that "the product is available at the point of purchase."

Regarding Claims 56, 65, 76 and 106, Bustos discloses various items stored and dispensed. Note in figure 4a, b, a soda bottle is dispensed, while in figure 4c, a hotdog is being dispensed. Even if it were considered not disclosed, at the very least, it would be considered obvious to prompt the customer to buy any number of items able to be dispensed by Bustos' dispenser because the intent of Bustos' dispenser is to sell items, and this would have been an obvious way of bringing such items to the attention of the customer for purchase. This combined with Terranova's teaching at col.9, lines 4-8 to "provide a video menu at the display to facilitate selection of various services, goods and food available for purchase." Again, note that Applicant's Claims 56, 65, 76 and 106 can be construed to read on Bustos and Terranova since both Bustos' and Terranova's dispensers store items, and dispense them at the point of purchase. The

EXHIBIT B



US006882900B1

(12) **United States Patent**
Terranova

(10) **Patent No.:** **US 6,882,900 B1**
(45) **Date of Patent:** **Apr. 19, 2005**

(54) **FUEL DISPENSING AND RETAIL SYSTEM
FOR PROVIDING CUSTOMER SELECTED
GUIDELINES AND LIMITATIONS**

(75) Inventor: **Steven N. Terranova, Durham, NC
(US)**

(73) Assignee: **Gilbarco Inc., Greensboro, NC (US)**

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 42 days.

(21) Appl. No.: **09/671,460**

(22) Filed: **Sep. 27, 2000**

Related U.S. Application Data

(62) Division of application No. 09/152,564, filed on Sep. 14,
1998, now abandoned.

(60) Provisional application No. 60/060,066, filed on Sep. 26,
1997.

(51) Int. Cl.⁷ **G07F 17/00**

(52) U.S. Cl. **700/237; 700/241; 700/242;
700/236**

(58) Field of Search **700/236, 242,
700/237, 241**

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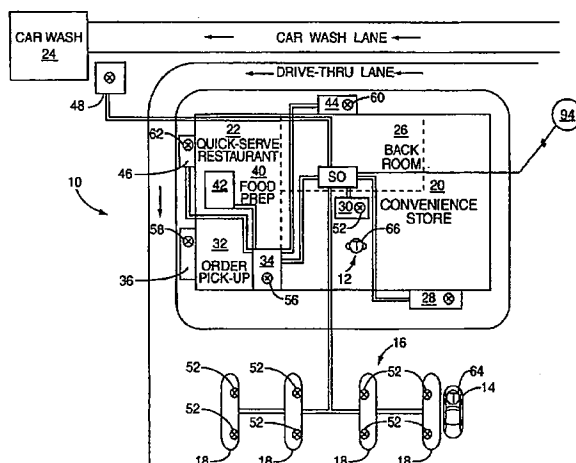
Primary Examiner—Donald P. Walsh
Assistant Examiner—Michael E. Butler

(74) Attorney, Agent, or Firm—Withrow & Terranova
PLLC

(57) ABSTRACT

The present invention provides a fuel dispensing system for setting transaction parameters in association with a remote communications unit. This system will include wireless or radio communications electronics adapted to receive signals from remote communications units, a transaction interface for carrying out transactions, and a control system and associated memory operating in conjunction with the communications electronics and a transaction interface. The control system is adapted to receive indicia from a remote communications unit and control the transaction at the transaction interface involving the remote communications unit according to predefined parameters associated with the remote communications unit. Any identification indicia and predefined parameters may be stored in the memory in association with the remote communications unit and the control system may be adapted to access these predefined parameters in the memory upon receipt of the identification indicia and control the transaction accordingly. Alternatively, the predefined parameters may be transmitted directly from the remote communications unit to the communications electronics and control system. The predefined parameters may limit a transaction to a select type or grade of fuel, a select type or amount of a product or service, as well as limiting or preventing the purchase of certain products or services. Notably, the control system may include a dispenser control system, a central site control system, a control system associated with a remote network, or a combination thereof.

14 Claims, 45 Drawing Sheets



US 6,882,900 B1

Page 2

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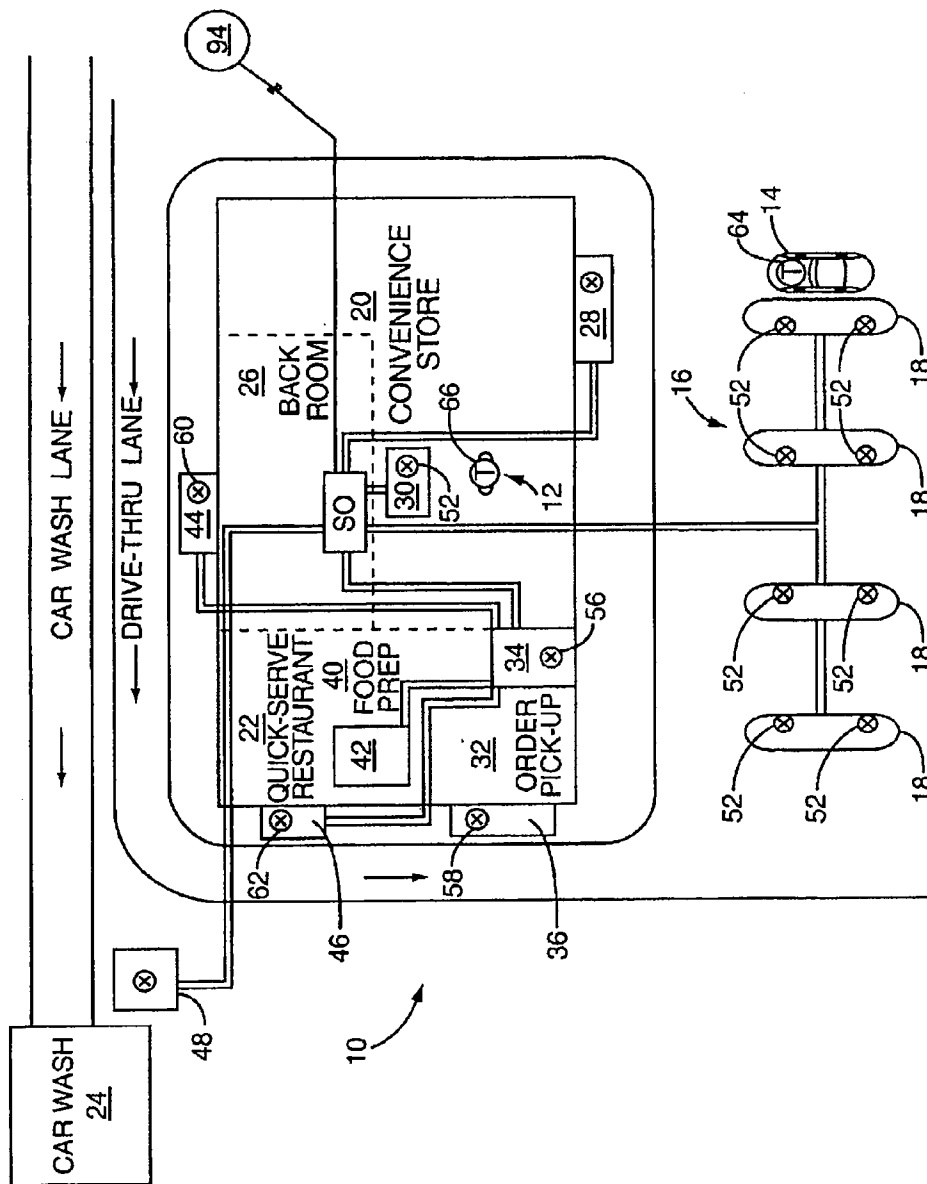


FIG. 1

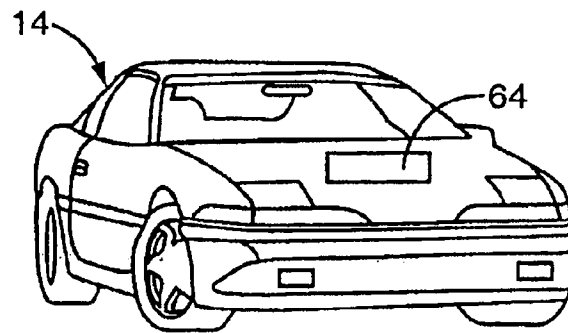


FIG. 2A

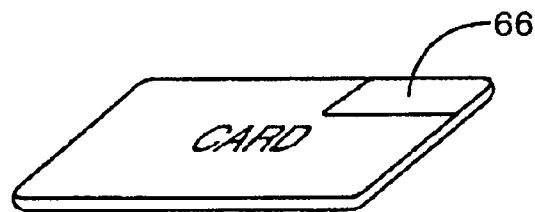


FIG. 2B

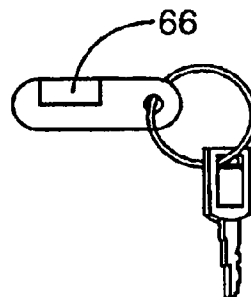


FIG. 2C

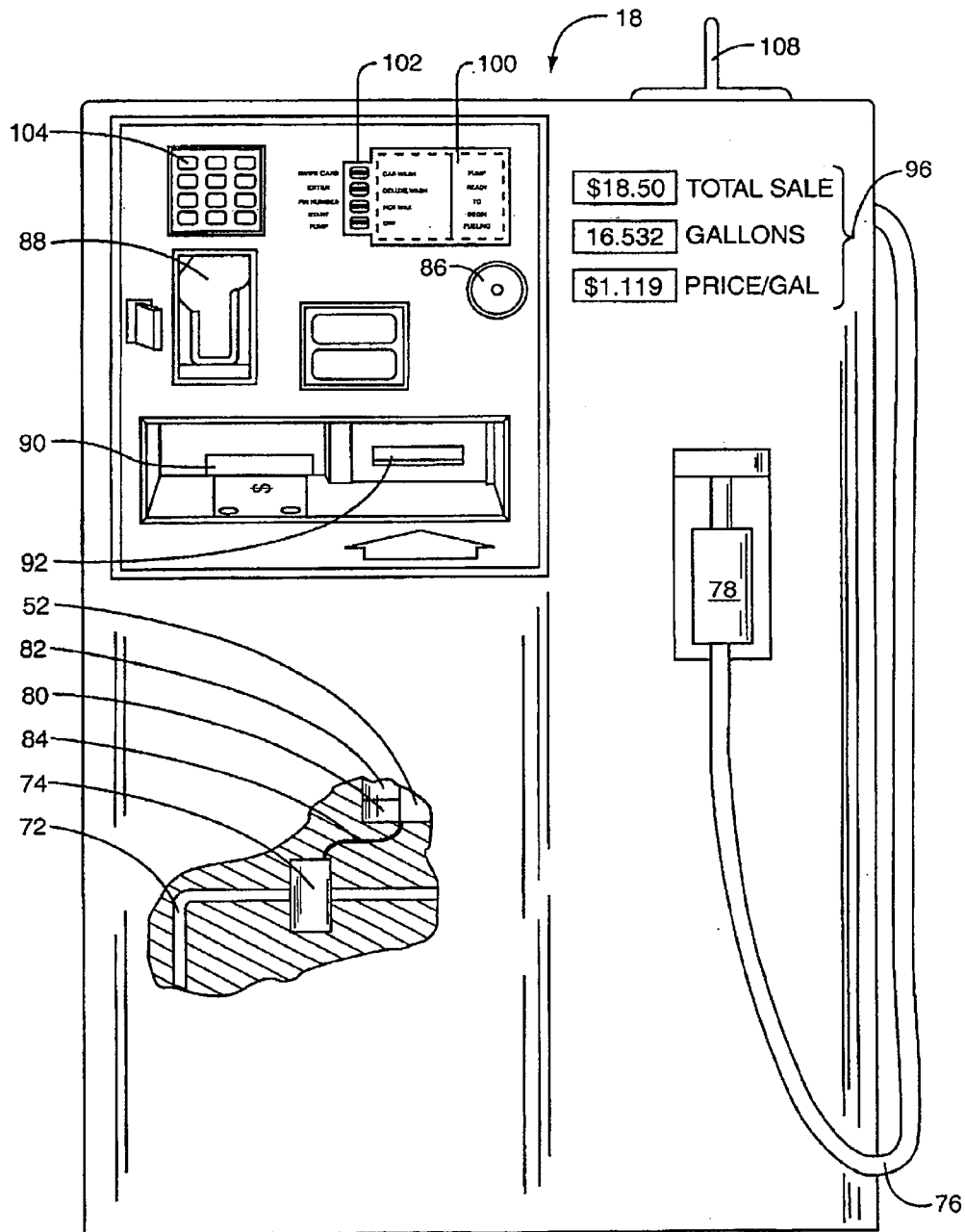


FIG. 3

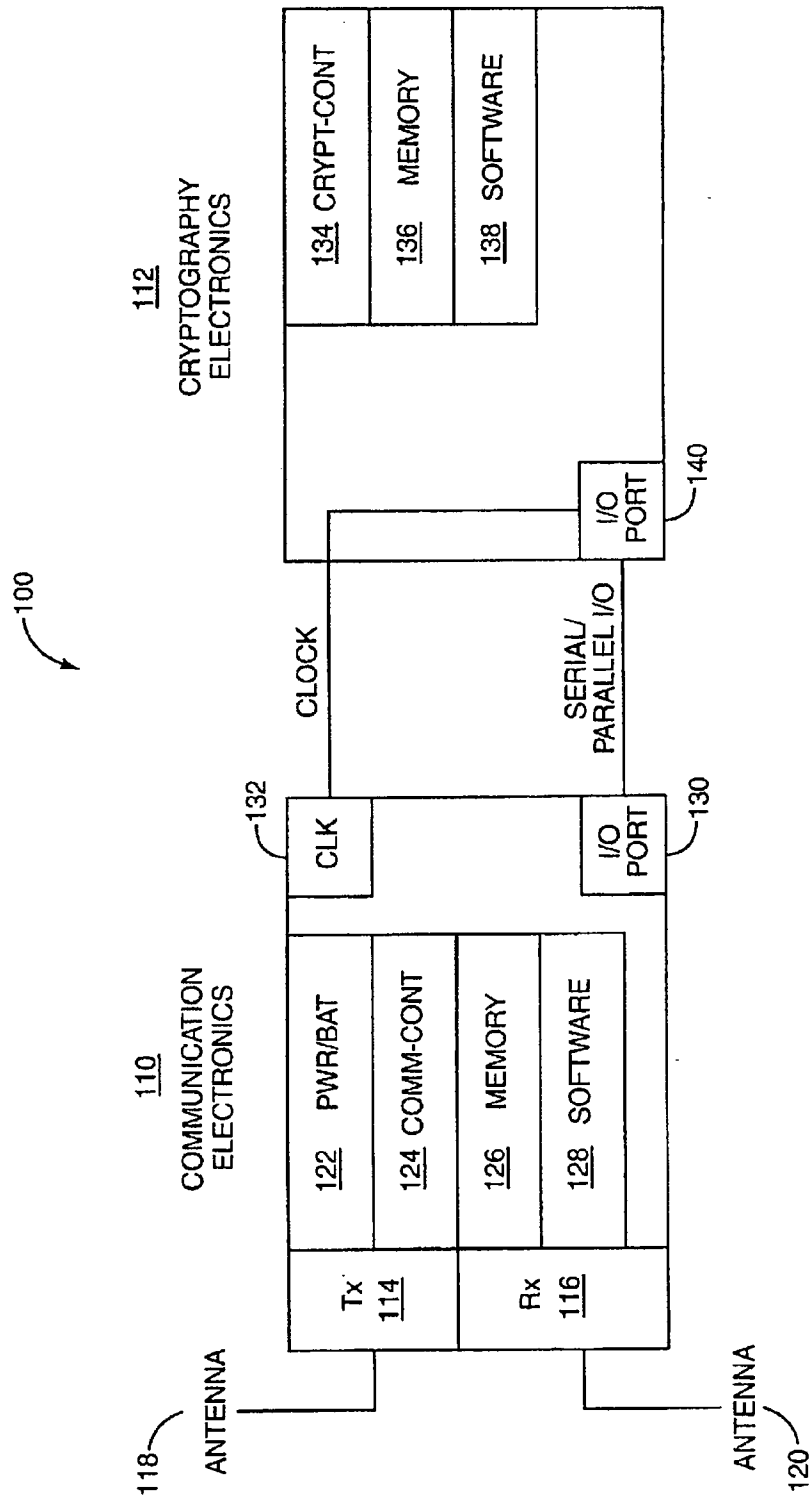


FIG. 4A

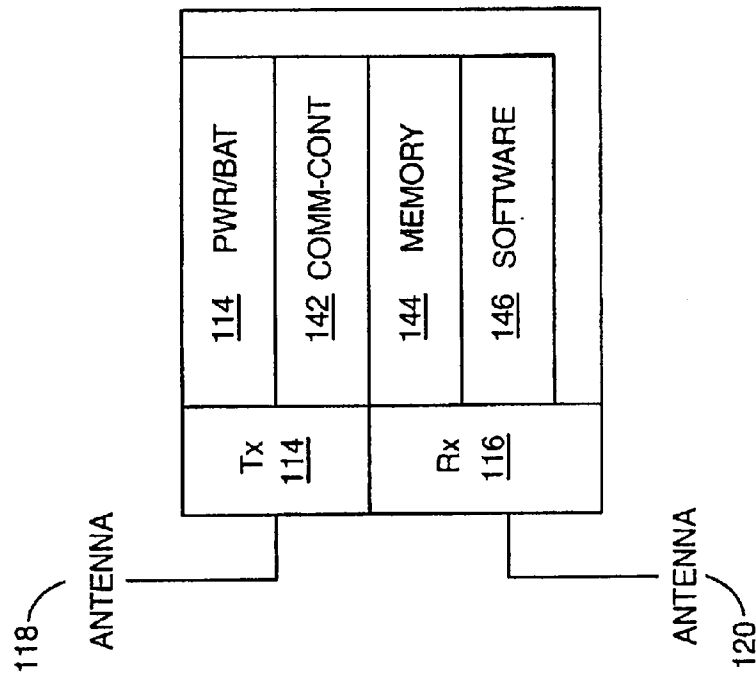


FIG. 4B

DISPENSER ELECTRONICS

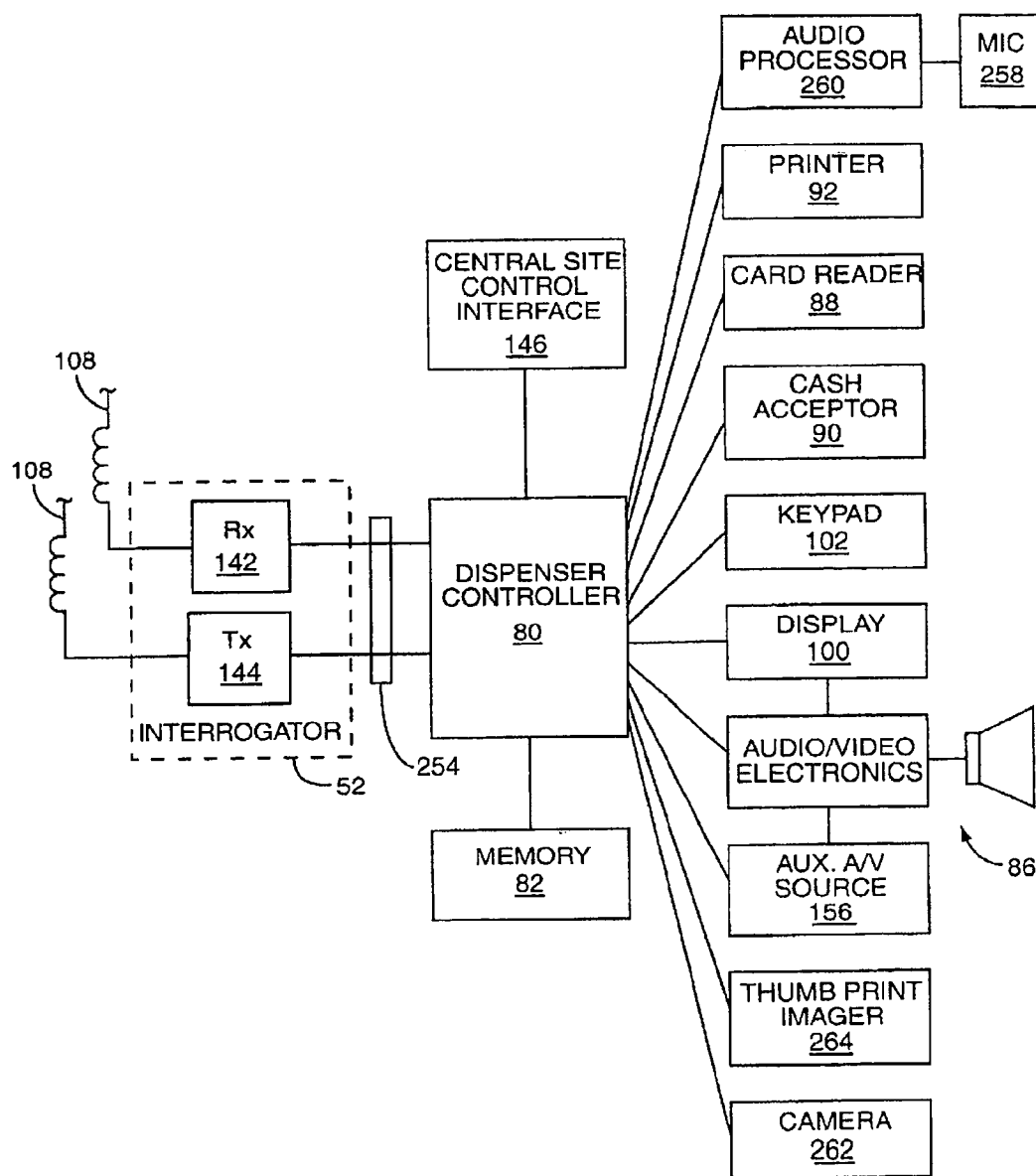


FIG. 5

FIG. 17

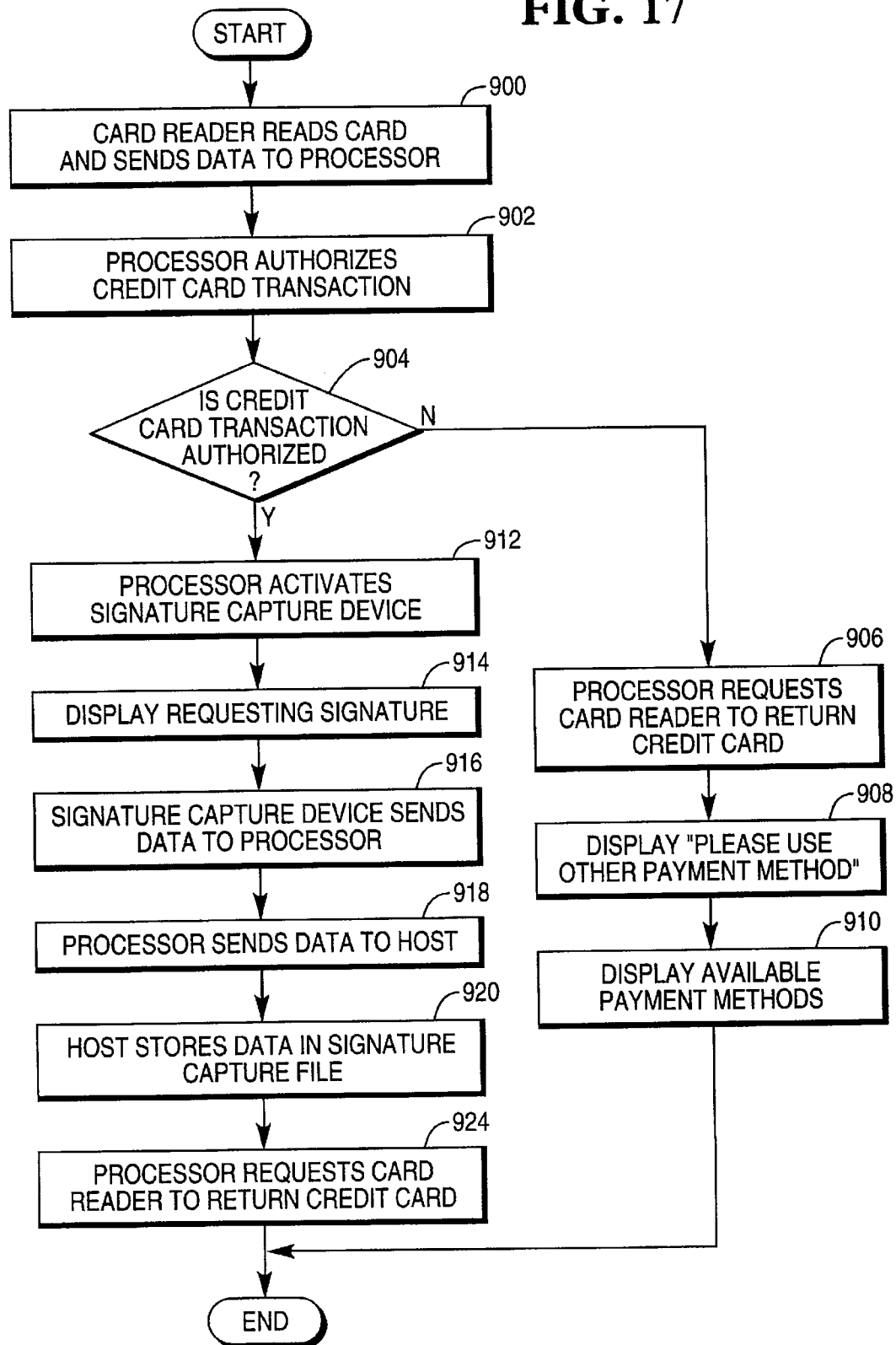


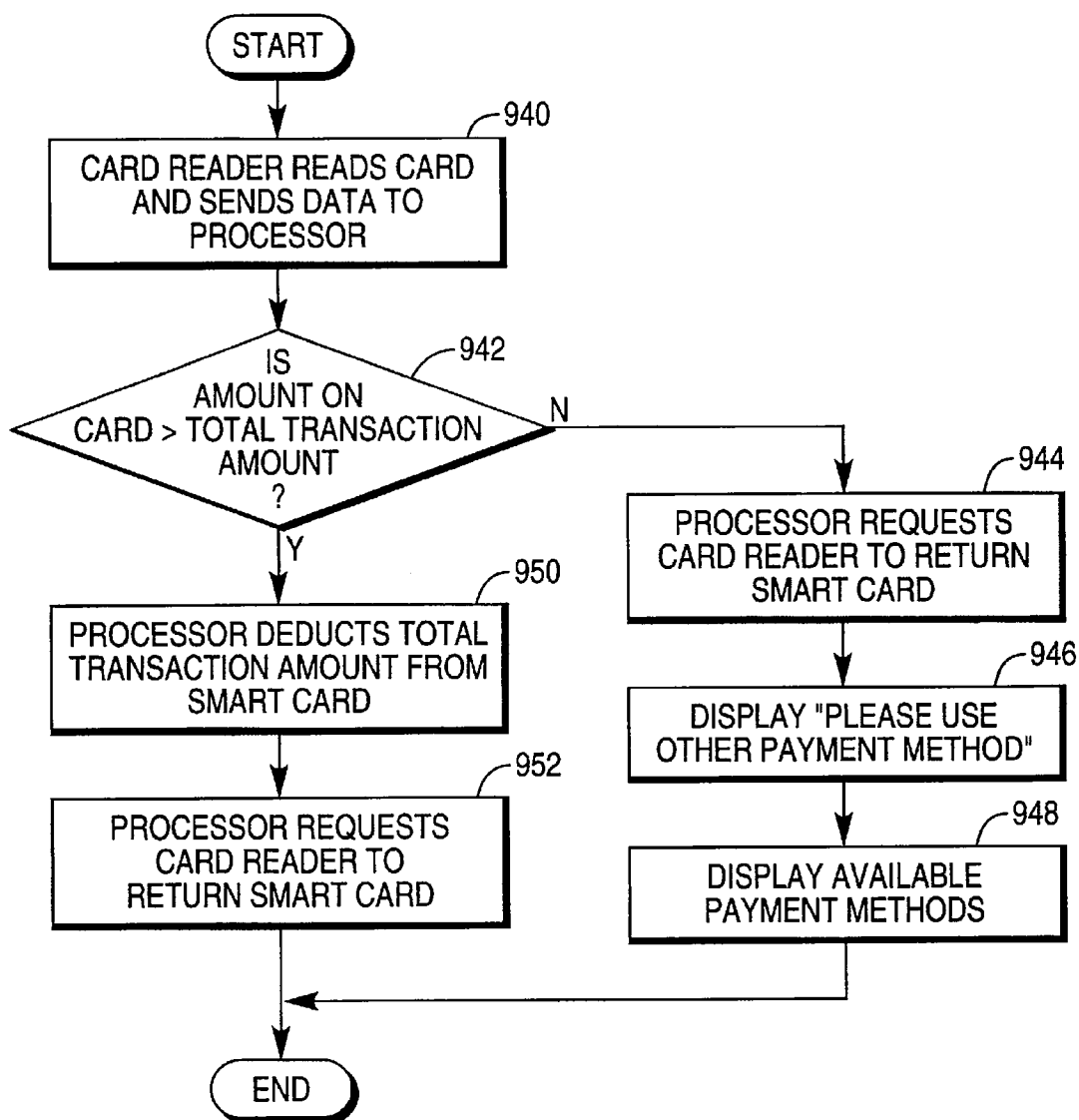
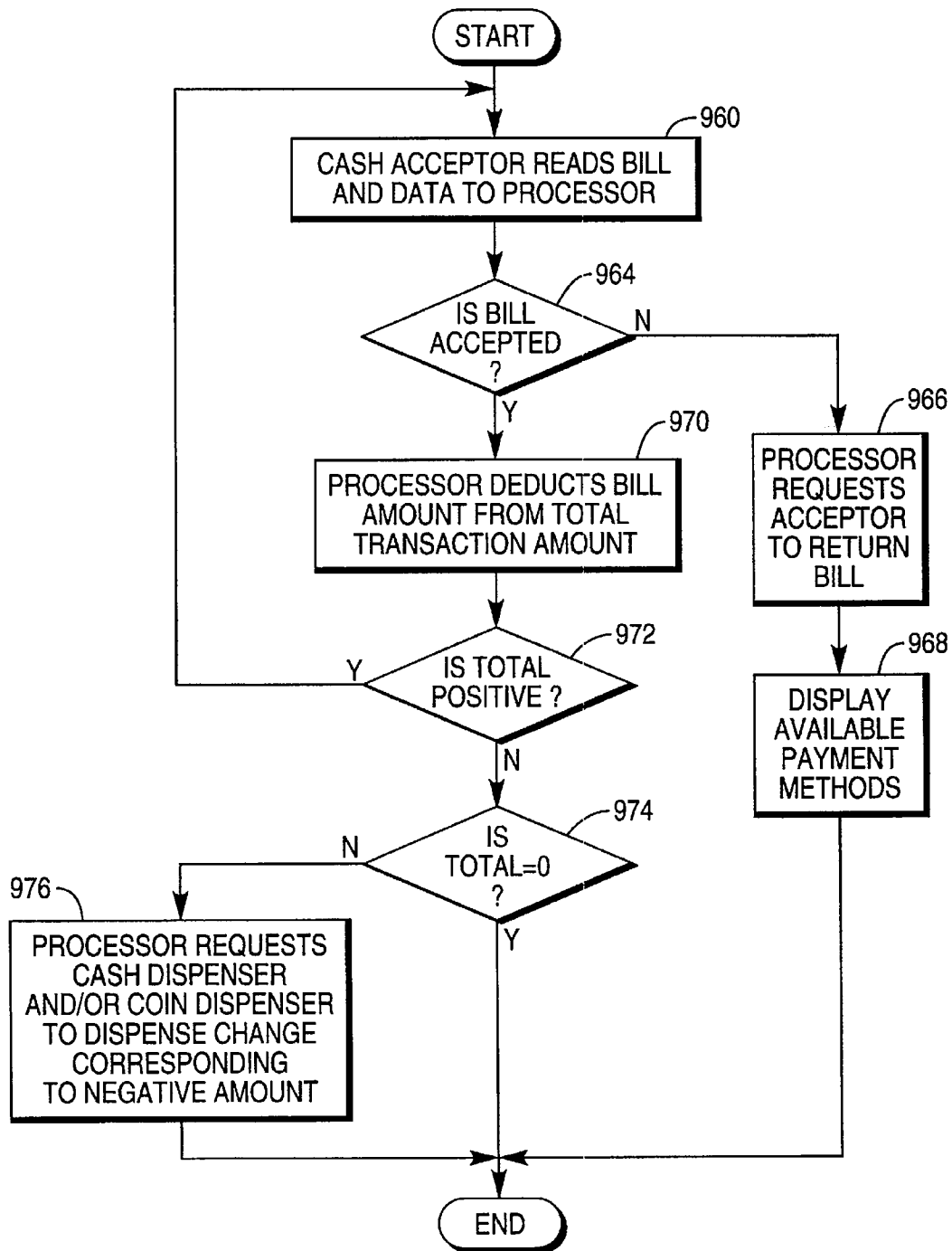
FIG. 18

FIG. 19



SELF-SERVICE CHECKOUT APPARATUS

This is a continuation of application(s) Ser. No. 08/658,420 filed on Jun. 5, 1996 now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a checkout apparatus for use in supermarkets or other retail establishments, such apparatus serving to process items selected by a customer for purchase and enabling the customer to check out and pay for such items.

In the supermarket industry, after the cost of the goods sold, labor is the fastest growing major expense. Reducing or eliminating the amount of time taken for a cashier to handle and scan the goods purchased by a customer can substantially reduce the labor required in a retail establishment and thereby alleviate a currently growing problem. Another problem experienced by supermarket management is the risk of repetitive motion disorders or injuries to cashiers brought about by the lifting and moving of hundreds of kilograms of goods every day. Thus, there are clearly potential advantages to be gained by using self-service procedures in the checking out process in retail establishments, particularly supermarkets.

From U.S. Pat. No. 4,676,343, there is known a self-service checkout system in which checkout counters are arranged in groups of two or more, with a single cashier station being provided for each group. Each counter is provided with a customer-operated laser scanner for enabling a customer to scan universal product code (UPC) labels carried by items selected by the customer for purchase. After scanning, the items are carried by a conveyor to a bagging area. When scanning is completed, a receipt unit at the counter delivers to the customer a printed recall number which is taken together with the subsequently bagged items to the cashier for payment and issuance of a final receipt. Although this system reduces labor costs to a significant extent, it is still necessary to provide a cashier for each group of typically five or six checkout counters. Also, the system has the disadvantage that there is a tendency for a queue to build up at each cashier station.

Another known system involves providing specially designed carts each carrying a portable data terminal. Each data terminal has RF capability for communicating with a remote data processing unit, and has an integrated laser scanner which allows a customer to scan items as they are removed from supermarket shelves prior to placing the items in the cart. In this way, a running total of the cost of the selected items is maintained, and customers can proceed to a cashier station when they have finished shopping merely to pay for their goods. This system has the disadvantage of having to provide a data terminal for each cart. Also, again this system requires that customers pay for their goods at a cashier station.

SUMMARY OF THE INVENTION

In accordance with one aspect of the present invention, there is provided a checkout apparatus for processing items selected by a customer for purchase. The apparatus includes customer operated means for identifying each item selected for purchase. The apparatus further includes self-service terminal means which includes payment accepting means for enabling the customer to make payment for the purchased items, cash dispensing means arranged to provide the customer with cash by way of change or otherwise, and electronic control means which is connected to the customer

operated means and which is arranged to determine the price of each item identified by the customer operated means. The self-service terminal means is arranged to provide to the customer an indication of the total amount to be paid by the customer for the purchased items.

Thus, it is an object of the present invention to provide a checkout system for use in a retail establishment which utilizes improved self-service procedures compared with the aforementioned known systems.

It is another object of the present invention to provide a checkout system which includes a single computing device which combines the functionality of an automated teller machine and a point-of-sale terminal.

It is another object of the present invention to provide a checkout system which guides a customer through a transaction to minimize customer confusion and to hasten the checkout process.

It is another object of the present invention to provide a checkout system which allows customers to purchase non-UPC products (no bar code).

BRIEF DESCRIPTION OF THE DRAWINGS

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a self-service checkout apparatus constructed in accordance with the invention;

FIG. 2 is a block diagram showing the electrical interconnections of components of the apparatus of FIG. 1;

FIG. 3 is a high level flowchart used in describing a complete customer transaction;

FIG. 4 is a flowchart used in describing the itemization procedure of a checkout transaction where a customer scans an individual item of merchandise, enters the product look-up (PLU) code in respect thereof, or weighs a produce item;

FIG. 5 is a flowchart of a program which is executed by the apparatus when an individual item of merchandise is scanned;

FIG. 6 is a flowchart of a program which is executed by the apparatus when a customer enters a PLU code;

FIG. 7 is a flowchart of a program which is executed by the apparatus when a produce item is being weighed;

FIGS. 8-12 are typical displays which appear on the screen of an automated teller machine (ATM) included in the apparatus of FIGS. 1 and 2 when a produce item is being weighed in accordance with the program in the flowchart of FIG. 7;

FIG. 13 is a flowchart used in describing the adjustment procedure that may be made in a checkout transaction subsequent to the completion of the itemization procedure of FIG. 4;

FIG. 14 is a flowchart of a program which is executed by the apparatus when a customer uses a coupon in the adjustment procedure of FIG. 13;

FIG. 15 is a flowchart of a program which is executed by the apparatus when a customer uses a special card in the adjustment procedure of FIG. 13;

FIG. 16 is a flowchart used in describing the finalization procedure in a checkout transaction subsequent to the completion of the adjustment procedure of FIG. 13;

FIG. 17 is a flowchart of a program which is executed by the apparatus when the customer uses a credit card to make payment for the purchased items to complete the checkout transaction;

FIG. 18 is a flowchart of a program which is executed by the apparatus when the customer uses a SMART card to make payment for the purchased items to complete the checkout transaction; and

FIG. 19 is a flowchart of a program which is executed by the apparatus when the customer uses bills to make payment for the purchased items to complete the checkout transaction.

DETAILED DESCRIPTION

Referring to FIGS. 1 and 2 of the drawings, there is shown therein a self-service checkout apparatus 10 in a supermarket. The apparatus 10 includes a security gate 12 located at an exit end of a customer passageway 11. Located on one side of the passageway 11 are a counter 14, a laser scanner/scale 16, and a self-service financial terminal 18 comprising an automated teller machine (ATM) 20 together with a currency acceptor module 22 having an input slot 134, a coin dispenser module 24 having a coin receptacle 61, and a coupon acceptor module 25 having a coupon slot 102. Also associated with the ATM 20 is a signature recognition pad 26 mounted on the coin dispenser module 24.

Preferably, self-service financial terminal 18 is an NCR multi-function ATM that has been modified to include hardware components found in a point-of-sale environment and software that integrates ATM functionality with point-of-sale transaction functionality. It should be noted that the ATM 20 can be used to provide conventional ATM services independently of any checkout transaction.

A recess 30 between the counter 14 and the coin dispenser module 24 accommodates a supply of plastic bags 32 suspended from a first pair of rails 34, and a further plastic bag 32' suspended from a second pair of rails 35. As will be described later, a customer loads purchased items of merchandise into the bag 32' in the course of a merchandise purchasing transaction. A surveillance video camera 36 linked to a remote monitoring station (not shown) is mounted above the scanner/scale 16, whereby a supervisor at a remote monitoring station can view the scanner/scale 16 and the bag 32' suspended from the rails 35 and thereby survey a complete checkout transaction carried out at the checkout apparatus 10.

In known manner, the ATM 20 includes a display screen 38, function keys 40 located on either side of the screen 38, a key pad 42 located beneath the screen 38, a currency dispenser module 44 which is mounted in a secure area inside the cabinet 46 of the ATM 20 and which is associated with a cash dispenser slot 48 in the cabinet 46, a card reader 50 arranged to read data from a card (such as a customer identification card, a debit card, a credit card, or a SMART card) inserted in the ATM 20 via a card slot 52, and print means 54 arranged to print paper items such as receipts, vouchers etc. and to supply such items to a customer via a receipt slot 58. A first modem 51 allows ATM 20 to maintain communication with host computer 124. A second modem 53 allows ATM 20 to process credit card payment authorization requests. Alternatively, a single modem and phone connection may be employed for both purposes.

Currency dispenser module 44 is manufactured by NCR. Card reader 50 is manufactured by NCR. Print means 54 is manufactured by NCR. Modems 51 and 53 are standard PC industry modules manufactured by a variety of vendors.

The ATM 20 also includes an electronic control means in the form of a PC processor unit 60 to which are coupled the scanner/scale 16, the signature pad 26, the function keys 40, the key pad 42, the card reader 50, the currency acceptor

module 22 and the coupon acceptor module 25, and which controls the operation of the display screen 38, the currency dispenser module 44, the coin dispenser module 24, the exit gate 12 and the print means 54. PC processor unit 60 is a PC-compatible processor.

The display screen 38 provides a continuous display which serves to guide a customer through a merchandise purchasing transaction, the display providing instructions to the customer at various stages of the transaction. For example, an instruction may involve the display instructing the customer to operate a selected one of the function keys 40, or to enter numerical data via the key pad 42. Thus, the customer may enter a Personal Identification Number (PIN) or a Product Look-Up (PLU) code via the key pad 42. As is well known, when the currency dispenser module 44 is instructed by the processor unit 60 to dispense cash, one or more currency notes are picked from one or more of a plurality of currency cassettes (not shown) included in the currency dispenser module 44 and are presented to a customer in the form of a stack through the currency dispenser slot 48. If in the course of a customer transaction coins are to be presented to the customer in addition to, or instead of, notes, then the processor unit 60 will instruct the coin dispenser module 24 to dispense the appropriate amount in coins for collection by the customer from the coin receptacle 61.

The signature recognition pad 26 may be a Model 5991 signature recognition pad marketed by NCR Corporation of Dayton, Ohio, U.S.A. As is known, the signature recognition pad 26 includes a pressure transducer plate 62 on which a customer "writes" his or her signature using a stylus (not shown). The pad 26 forms a digitized image of the signature and this image is transmitted to the processor unit 60 of the ATM 20 for storage therein.

Most items in a supermarket, other than fruit and vegetable produce or delicatessen items, carry a bar code, i.e. the universal product code (UPC), which identifies the item. The scanner/scale 16 is used to read UPC bar codes, and is also used to weigh items which do not carry a bar code. In the present embodiment of the self-service checkout apparatus 10, the scanner/scale 16 is an NCR 7870 scanner/scale marketed by NCR Corporation. The scanner/scale 16 has a weighing scale plate 66 which is flush-mounted relative to the upper surface of the counter 14. A scanning window 68 is provided in the scale plate 66, and the scanner/scale 16 is also provided with an upstanding scanning window 70. Thus, the scanner/scale 16 has the ability to read bar codes on any one of four sides of a package.

In addition, the scanner/scale can read bar codes on items moved from left-to-right or right-to-left over the window 68 or simply placed on the window 68. It will be appreciated, therefore, that the scanner/scale 16 is very easy to operate, and can be successfully used by members of the public without prior training. The scanner/scale 16 generates an audible tone when a successful scan has been completed, and a signal identifying the scanned item is sent by the scanner/scale 16 to the processor unit 60 of the ATM 20. Upon receiving this signal, the ATM 20 will display on the display screen 38 wording identifying the scanned item together with an indication of its price.

If merchandise is to be purchased which does not carry a bar code and which requires to be weighed, such as fruit and vegetable produce, then the merchandise is placed on the scale plate 66 (usually in a plastic bag) and the merchandise is identified using the function keys 40, as will be explained in more detail later. A signal indicative of the weight of the

5

merchandise is sent by the scanner/scale 16 to the processor unit 60, and upon receipt of this signal the ATM 20 will display on the display screen 38 wording identifying the weighed merchandise together with an indication of its price.

In the apparatus of the present invention, the hardware and software of an automated teller machine are integrated with the hardware and software of a point-of-sale terminal. Thus, the hardware elements of FIG. 2 may be integrated together into a single computer cabinet. Peripherals 16, 22, 24, 25, 26, 40, 42, 44, 50, and 54 preferably connect to a serial controller in a well-known manner, such as an RS 232 or universal serial bus (USB) controller. Display screen 38 preferably connects to a video controller in a well-known manner. Photosensor 126 and exit gate 12 couple to exit gate control circuitry in a well-known manner. The above controllers may reside on adapter cards or on a motherboard that supports processor unit 60.

The software architecture is preferably designed to work with the Microsoft Windows NT operating system, however, other suitable operating systems are envisioned. Thus, the software architecture includes a self-service checkout application and hardware drivers that allow the operating system to communicate with the peripherals of FIG. 2.

The self-service checkout application includes the combined software functions of a point-of-sale terminal and an automated teller machine. The self-service checkout application includes software objects for the elements of FIG. 2 that are easily created using well-known object-oriented programming techniques. These software objects allow the self-service checkout application to control the peripherals through the operating system, and their operation in completing a transaction is described in the flow diagrams of FIGS. 5-7, 14-15, and 17-19.

For security reasons, the described embodiment of the present invention is intended for use by customers who have been provided with a customer identifying card (shopping card) by the supermarket. However, it should be understood that the use of a customer identification card is not an essential requirement of the present invention, and other security measures could be employed as will be indicated later.

When using the self-service checkout apparatus 10 described herein, a customer will approach the counter 14 with merchandise to be purchased held in a conventional shopping trolley or cart 72. At this stage, the display screen 38 of the ATM 20 will be displaying a standard initial message. It should be understood that during the opening hours of the supermarket, the surveillance camera 36 is permanently operated, so that the arrival of the customer and the cart 72 holding the merchandise to be purchased can be seen by the supervisor at the remote monitoring station.

Referring now to FIG. 3, when the customer arrives at the checkout apparatus 10, the apparatus is in an idle condition (block 74). As instructed by the initial message on the display screen 38, the customer initiates an ATM or checkout transaction by depressing the designated function key 40. This causes the apparatus to become fully activated (block 76), with the scale reading of the scanner/scale 16 being set to zero. Next, the display on the screen 38 changes so as to request the customer to indicate whether he or she wishes to carry out an ATM transaction by depressing an appropriate one of the function keys 40 (block 77). If the customer does not select an ATM transaction, then the process flow proceeds to a pre-itemization stage (block 78) in which first the display on the screen 38 instructs the customer to identify

6

himself or herself by inserting his or her shopping card into the card slot 52, this card being returned to the customer immediately after the information on the card has been read by the card reader 50.

Next in the pre-itemization stage (block 78), the display on the screen 38 instructs the customer to suspend a bag 32' from the rails 35 (this bag being obtained from the supply of bags 32 suspended from the rails 34), and to initiate a checkout transaction by depressing a designated one of the function keys 40. As will be described in more detail later, the customer then carries out the itemization procedure (block 80) in which using the scanner/scale 16 the customer scans or weighs the individual items of merchandise taken from the shopping cart 72. After the itemization procedure has been completed, the displays on the screen 38 instructs the customer how to proceed through an adjustment procedure (block 82) and a finalization procedure (block 84) after which the security gate 12 is opened (block 85) and the apparatus 10 is reset (block 86) so as to return it to its initial idle condition (block 74).

If the customer in block 77 selects an ATM transaction, then in known manner the screen 38 will display a series of messages guiding the customer through a conventional ATM transaction (block 87) which will involve the customer requesting one or more services such as withdrawal of cash, or the provision of a statement of account or balance of account, etc. In known manner, at the commencement of the ATM transaction, the customer is requested to insert his or her ATM card (customer identifying card) into the card slot 52 and to enter his or her PIN using the key pad 42. The ATM card is returned to the customer prior to the completion of the ATM transaction. If a cash withdrawal service is requested, then the requested amount of cash in the form of one or more currency notes is presented to the customer through the dispenser slot 48, and a cash withdrawal statement, printed by the print means 54, is presented to the customer through the receipt slot 58.

After the ATM transaction (block 87) is completed, the display on the screen 38 requests the customer to indicate whether he or she now wishes to carry out a checkout transaction by depressing an appropriate one of the function keys 40 (block 88). If the customer does wish to carry out a checkout transaction, then the process flow proceeds to the pre-itemization stage represented by the block 78. If the customer does not wish to carry out a checkout transaction, then the security gate 12 is opened (block 85) so as to permit the customer to pass through the gate 12 away from the checkout apparatus 10, and the apparatus is reset (block 86) and returned to its idle condition (block 74).

The itemization procedure of block 80 of FIG. 3 will now be described in more detail with particular reference to FIG. 4. When the pre-itemization stage (block 78 of FIG. 3) is completed, messages are displayed on the screen 38 by way of instructions to the customer for carrying out the itemization procedure of FIG. 4. The customer is provided with instructions via the screen 38 to remove each item of merchandise in turn from the shopping cart 72.

In the case of an item carrying a bar code (block 200 of FIG. 4), the item is scanned (block 202) by passing it over the window 68 in the scale plate 66. More specifically, the customer is instructed to pass the item over the window 68 with the bar code facing downwardly, or rearwardly or to either side. If the scan is successful, an audible tone is generated by the scanner/scale 16 and the price and identity (name, brand, weight, etc.) of the scanned item are displayed on the screen 38 and printed by the print means 54 on a

receipt which is presented to the customer through the receipt slot 58 at the completion of the purchasing transaction. The display on the screen 38 instructs the customer to place the successfully scanned item in the bag 32' (block 214).

As the item is being scanned, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 5. As shown in step 300 of FIG. 5, the scanner/scale 16 is initialized before the bar code label is scanned in step 302. The scanner/scale 16 then decodes the bar code label to provide a product identification number associated with the item as shown in step 304 before sending this information to the processor unit 60 as shown in step 306. The processor unit 60 in turn sends this information to the host computer 124 as shown in step 308.

The host computer 124 uses the product identification number associated with the item to obtain a description of the item and a price of the item from a price look-up file stored in memory at the host computer 124 as shown in step 310. The host computer 124 then sends this information to the processor unit 60 as shown in step 312. The description of the item and the price of the item are displayed on the display screen 38 as shown in step 314. The price of the item is then added to the transaction total which is stored in memory at the processor unit 60.

If the scan (blocks 200 and 202 in FIG. 4) is not successful, the customer is instructed to ascertain and enter the PLU code for the item (blocks 204 and 206). Instead of scanning an item (for example if the item is of an awkward shape), the customer may proceed directly to the PLU code procedure (block 206) for entering the PLU code. In the PLU code procedure, the customer is instructed by the display on the screen 38 to read the PLU code from a label on the item in question, and to enter the PLU code by means of the key pad 42. The ATM 20 confirms that the PLU code has been correctly entered by displaying the identity and price of the item on the screen 38, this information being printed on the receipt as in the case of a scanned item. After the PLU code has been correctly entered, the customer places the item in the bag 32' (block 214).

When the PLU code is entered for the item, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 6. As shown in step 400 of FIG. 6, the processor unit 60 sends the entered PLU code to the host computer 124. The host computer 124 decodes the PLU code as shown in step 402 to obtain a product identification number for the item. The host computer 124 uses the product identification number associated with the item to obtain a description of the item and a price of the item from a price look-up file stored in memory at the host computer 124 as shown in step 404. The host computer 124 then sends this information to the processor unit 60 as shown in step 406. The description of the item and the price of the item are displayed on the display screen 38 as shown in step 408. The price of the item is then added to the transaction total which is stored in memory at the processor unit 60 as shown in step 410.

In the case of an item which does not carry a bar code (such as a delicatessen item or an item of fruit or vegetable produce) or which has been unsuccessfully scanned or is inconvenient to scan, the customer is instructed to place the item on the scale plate 66 if it is to be weighed (blocks 208 and 210 of FIG. 4) or to enter a PLU code for the item (blocks 204 and 206).

When the item is to be weighed, the customer places the item on the scale plate 66 and enters the identity of the item

using the function keys 40 (blocks 208 and 210 of FIG. 4). The act of placing the item on the scale plate 66 causes an appropriate menu to be displayed automatically on the screen 38. Typical menus displayed on the screen 38 are shown in FIGS. 8-12. By selecting appropriate displayed options using the function keys 40, the item of merchandise on the scale plate 66 is identified by the customer.

For example, "Golden Delicious" apples are identified by activating the function key 40A in FIG. 8, the function key 40B in FIG. 9, the function key 40C in FIG. 10, and the function key 40D in FIG. 11. The scanner/scale 16 transmits a signal indicative of the weight of the item to the processor unit 60 of the ATM 20, and thus when the customer has identified the item the processor unit 60 causes the identity and price of the item to be displayed on the screen 38 and to be printed on the receipt. When the successful entry of a weighed item has been confirmed by virtue of the identity and price of the item being displayed on the screen 38 as shown in FIG. 12, the item is placed in the bag 32' (block 214 of FIG. 4). The customer then depresses either the function key 40E or the function key 40F, depending on whether or not he or she wishes to check out a further item of produce.

As the item is being weighed, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 7. As shown in step 500 of FIG. 7, the sequence of menus (FIGS. 8-12 for example) is displayed to allow the customer to identify the type of produce which is being purchased. After the type of produce is identified, the scanner/scale 16 establishes the weight of the produce and sends this weight information to the processor unit 60 as shown in FIG. 502. In step 504, the processor unit 60 obtains a price per unit of the identified type of produce from the host computer 124. The processor unit 60 uses the actual weight of the produce and the price per unit of the produce to calculate a total price by multiplying the weight and the price per unit as shown in step 506. The total price of the produce is then displayed on the display screen 38 as shown in step 508.

After a item has been placed in the bag 32', the customer removes the next item from the cart 72 and repeats the itemization procedure of scanning the item (blocks 200 and 202 of FIG. 4), ascertaining and entering the PLU code for the item (blocks 204 and 206), or weighing and identifying the item (blocks 208 and 210) before again placing the item in the bag 32' (block 214). The itemization process just described is continued until the last item (block 216 of FIG. 4) has been placed in the bag 32' whereupon the customer indicates that the processing of the purchased items has been completed by operating an appropriate one of the function keys 40, at which time the total amount payable by the customer is displayed on the screen 38.

If, in the course of a lengthy checkout transaction, the bag 32' becomes full or substantially full, the bag 32' can be removed from the rails 35, placed in the cart 72, and replaced by an empty bag obtained from the rails 34, prior to continuing with the itemization procedure.

Referring now back to FIG. 3, after the customer has indicated that the itemization procedure (block 80) has been completed, a message appears on the screen 38 inquiring as to whether the customer has any adjustments (block 82) to make, such as discount vouchers of predetermined type which he or she wishes to use. By actuating an appropriate one of the function keys 40, the customer indicates whether there are one or more such coupons to be used as shown in block 240 of FIG. 13. If there are, then the customer inserts

9

(block 242) the each coupon into the coupon slot 102 of the coupon acceptor 25. A determination (block 244) is made by the coupon acceptor 25 in a known way as to whether the coupon inserted by the customer is valid.

As the customer inserts a coupon into the coupon acceptor 25, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 14. As shown in step 700 of FIG. 14, the processor sends a signal to the coupon acceptor 25 to activate the coupon acceptor. When activated, the coupon acceptor 25 reads the inserted coupon as shown in step 702, and then sends information read from the coupon to the processor 704 as shown in step 704. The processor unit 60 in turn sends this coupon information to the host computer 124 as shown in step 706.

As shown in step 708 of FIG. 14, the host computer 124 validates the coupon information in a known manner by using data from a coupon look-up file which is stored in memory at the host computer 124. If the coupon information is determined to be valid in step 710, then the program proceeds to step 712 in which the host computer 124 sends a message back to the processor unit 60 indicating that the inserted coupon is valid. Otherwise, the program proceeds to step 714 in which the host computer 124 sends a message back to the processor unit 60 indicating that the inserted coupon is invalid.

After all coupons have been inserted in the coupon acceptor 25 and assuming that all of the inserted coupons are valid, the processor unit 60 adjusts the total price (block 246 of FIG. 13) of the purchased items and causes this adjustment to be entered on the receipt to be issued to the customer. If in the step represented by block 240 the customer indicates that there are no coupons to be used, then a message appears on the screen 38 inquiring as to whether the customer possesses a special case card (such as a card issued to employees of the supermarket).

If the customer does have a special case card (block 248 of FIG. 13), the customer inserts this card (block 250) into the card slot 52 of the ATM 20, the card reader 50 reads the information carried on a magnetic stripe of the special case card and the processor unit 60 makes the appropriate adjustment (block 246) to the total purchase price, after which the card is returned to the customer. It should be understood that a special case card may be the same card as the shopping card used by the customer in the pre-itemization step represented by block 78 in FIG. 3.

When a special case card is inserted into the card slot 52 of the ATM 20, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 15. As shown in step 800, the card reader 50 reads the special case card and sends this information to the processor unit 60. The processor unit 60 in turn sends this information to the host computer 124 as shown in step 802. The host computer 124 uses this information and obtains a discount rate from a discount look-up file stored in memory at the host computer 124 as shown in step 804. The host computer 124 uses the discount rate to calculate the total discount amount to be applied to the checkout transaction as shown in step 806, and sends this amount to the processor unit 60 as shown in step 808. The processor unit 60 then adjusts the total transaction amount of the checkout transaction with the applicable total discount amount as shown in step 810. After any such adjustment has been made or if customer does not have coupons or a special case card, the apparatus proceeds to the finalization procedure (block 84 of FIG. 3) as will now be described with reference to FIG. 16.

At the commencement of the finalization procedure, the total amount payable by the customer is displayed on the

10

screen 38 and a message is displayed on the screen 38 inquiring as to whether the customer wishes to pay by card (magnetic stripe credit card or SMART card) or by cash. The customer makes this selection by actuating an appropriate one of the function keys 40.

If the customer elects to pay by a credit card (block 260 of FIG. 16), the customer is instructed by a message on the screen 38 to insert his or her credit card into the card slot 52 (block 262). The customer is then instructed by a message on the screen 38 to carry out a credit card authorization procedure by entering his or her signature using the signature pad 26. A digitized version of the customer's signature is stored in a memory section of the processor unit 60 for possible future reference in the event of a dispute occurring in respect of a particular checkout transaction.

When the customer inserts the credit card into the card slot 52, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 17. As shown in step 904 of FIG. 17, the card reader 50 reads information from the credit card in response to insertion of the credit card into the card slot 52, and then sends this information to the processor unit 60. In step 902, the processor unit 60 takes the necessary steps to authorize the credit card transaction in a known manner. If the credit card transaction is not authorized, as determined in step 904, then the program proceeds to step 906 in which the processor unit 60 sends a message to the card reader 50 to instruct the card reader to return the credit card to the customer. The processor unit 60 then displays a message to the screen 38 indicating to the customer that another payment method needs to be selected as shown in step 908. Also, the available payment methods are displayed on the screen 38 as indicated in step 910.

If the credit card transaction is authorized, as determined in step 904, then the program proceeds to step 912 in which the processor unit 60 sends a signal to the signature recognition pad 26 to activate the device. When the signature recognition pad 26 is activated, a message is displayed on the screen 38 requesting that the signature of the customer be provided. After capturing the signature of the customer, the signature recognition pad 26 sends this information to the processor unit 60 as shown in step 916 which, in turn, sends the information to the host computer 124 as shown in step 918. The host computer 124 then stores this signature in a transaction file containing the details of the transaction at the host computer 124 as shown in step 920, and the processor unit 60 sends a signal to the card reader 50 to return the credit card to the customer as shown in step 924.

A message then appears on the screen 38 inquiring if the customer requires cashback. By cashback is meant a facility provided by the supermarket to a customer paying by a debit or credit card which enables the customer to obtain cash up to a predetermined limit in the course of a checkout transaction. This facility has an advantage from the supermarket's point of view in that it reduces the amount of cash which has to be banked. The customer indicates whether or not cashback is required by actuating an appropriate one of the function keys 40.

If the customer does not require cashback, then the total amount payable by the customer is displayed on the screen 38, a receipt on which are printed details of all the purchased items and of any adjustments together with the final total payable is issued to the customer through the slot 58, and the processor unit 60 sends a signal to a host computer 124 (FIG. 2) indicative of the amount to be debited to the customer's account corresponding to the credit card used. If the cus-

11

tomer indicates that he requires cashback, then the total amount payable is adjusted by the processor unit 60, to reflect the amount of cashback requested by the customer, prior to causing the total amount to be printed on the receipt. The processor unit 60 then causes the dispenser module 44 (and possibly also the coin dispenser 24) to dispense the requested amount of cash requested by the customer by way of cashback.

If the customer elects to pay by SMART card (block 264 of FIG. 16), the customer is instructed by a message on the screen 38 to insert his or her SMART card into the card slot 52 (block 264). When the customer inserts the SMART card into the card slot 52, the apparatus 10 operates in accordance with a program which is depicted in the flowchart of FIG. 18. As shown in step 940 of FIG. 18, the card reader 50 reads information from the SMART card in response to insertion of the SMART card into the card slot 52. If the amount of available cash on the SMART card is not equal to or greater than the total transaction amount, as determined in step 942, then the program proceeds to step 944 in which the processor unit 60 sends a message to the card reader 50 to instruct the card reader to return the SMART card to the customer. The processor unit 60 then displays a message on the screen 38 indicating to the customer that another payment method needs to be selected as shown in step 946. Also, the available payment methods are displayed on the screen 38 as indicated in step 948.

If the amount of available cash on the SMART card is at least equal to the total transaction amount, as determined in step 942, then the program proceeds to step 950 in which the processor unit 60 updates the SMART card by deducting the total transaction amount from the SMART card. The processor unit 60 then sends a signal to the card reader 50 to return the SMART card to the customer as shown in step 952. A message may also appear on the screen 38 inquiring if the customer requires cashback as already described hereinabove with respect to the use of a credit card.

If the customer elects to pay by cash (block 268 of FIG. 216), the customer is instructed by a message on the screen 38 to insert into the input slot 134 of the cash acceptor module 22 a note or notes to a value equal to or greater than the total amount payable as shown in step 270. When the customer inserts a note into the input slot 134 of the note acceptor 22, the apparatus operates in accordance with a program which is depicted in the flowchart of FIG. 19. As shown in step 960 of FIG. 19, the note acceptor 22 reads the amount of the inserted bill sends a signal to the processor unit 60 indicative of the amount of the bill. The processor unit 60 makes a determination, as shown in step 964, as to whether the bill is acceptable. If the bill is determined to be unacceptable in step 964, then the program proceeds to step 966 in which the processor sends a signal to the cash acceptor to return the bill to the customer. The processor unit 60 also displays on the screen 38 the available payment methods as shown in step 968.

If the bill is determined to be acceptable in step 964, then the program proceeds to step 970 in which the processor unit 60 deducts the amount of the bill from the total transaction amount. If the total transaction amount after deducting the bill amount is still positive, as determined in step 972, then the customer needs to insert more cash and the program returns to the start to receive another bill. If the total transaction amount after deducting the bill amount is not positive, as determined in step 972, then the program proceeds to step 974.

In step 974, a determination is made as to whether the total transaction amount after deducting the bill amount is

12

equal to zero. If the determination in step 974 is affirmative, then the customer has paid a cash amount equal to the total transaction amount and the program ends. If the determination in step 974 is negative, then the customer is owed some change and the program proceeds to step 976. If change is required, then a signal is sent by the processor unit 60 to the coin dispenser module 24 and/or to the cash dispenser 44 causing the appropriate amount of change to be dispensed for collection by the customer. The finalization procedure (block 84 of FIG. 3) is now completed.

When the finalization procedure in block 84 of FIG. 3 is completed, the processor unit 60 sends a signal to the security gate 12 so as to bring about opening of the gate 12. The apparatus is then reset as previously described (block 86 of FIG. 3) and returned to its idle condition (block 74 of FIG. 3). At the end of a finalization procedure in block 84 of FIG. 3, the customer takes any cash that is due to him or her by way of change or cashback. As previously described, this cash is presented to the customer through the note dispenser slot 48 of the ATM 20 and/or at the coin receptacle 61 of the coin dispenser 24. The customer also takes the receipt presented through the receipt slot 58. Finally, the customer also removes the bag 32' containing the purchased items from the rails 35, places the 32' bag in the cart 72, and proceeds through the opened security gate 12.

A photosensor device 126 (FIG. 2) located in the vicinity of the gate 12 senses when the customer and cart 72 have passed through the gate 12 and then sends a signal to the processor unit 60 which causes the gate 12 to be returned to its closed, locked condition in readiness for the next customer. After the gate operates as shown in block 85 of FIG. 3, the process flow proceeds to block 86 in which the checkout apparatus 10 is reset as represented by block 86 in FIG. 3 before returning to the idle condition (block 74).

As an additional security measure, the management of the supermarket may from time to time carry out a spot check on the contents of a cart 72 after the accompanying customer and the cart 72 have proceeded through the exit gate 12. Thus, this check will involve comparing the contents of the cart 72 with the purchased items listed on the receipt presented to the customer at the end of the relevant transaction. If such spot check results in a discrepancy being found, then if the customer is unable to give a satisfactory explanation, some action may be taken against the customer such as withdrawal or inactivation of his or her shopping card.

In general, a supermarket or other retail establishment would have a plurality of self-service checkout apparatuses as described hereinbefore. The security video cameras 36 of the various self-service checkout apparatuses would all be linked to the same remote monitoring station. In addition, the supermarket or other retail establishment would have a plurality of conventional, cashier-attended checkout counters for use, for example, by customers who do not have a customer identifying shopping card.

It should be understood that a checkout apparatus in accordance with the present invention, such as the checkout apparatus 10 described herein by way of example with reference to the accompanying drawings, has the advantage that a complete checkout transaction can be effected by a customer without the involvement of any member of staff of the relevant retail establishment. Moreover, such checkout transaction can include the dispensing of change or cashback to the customer, again without the involvement of any member of staff. However, if at any time in the course of a checkout transaction a customer requires assistance, the

13

customer can summon the help of a member of staff by actuating an appropriate one of the function keys 40. Also, if in the course of a checkout transaction the processor unit 60 determines that a required action on the part of a customer has been omitted or incorrectly performed, then the processor unit 60 will cause an alarm signal to be sent to the monitoring station, which will normally result in a member of staff going to the checkout apparatus 10 for the purpose of investigating a possible problem.

Other advantages of the self-service checkout apparatus described herein are that the apparatus gives a customer the choice of paying by card or cash, and enables adjustments to be made if the customer has coupons or a special case card (e.g. employee card).

Another important advantage of the checkout apparatus 10 described herein is that the ATM 20 which forms an essential part of, and controls the operation of, the checkout apparatus can be used to provide all the normal services of an ATM independently of any checkout transaction. Thus, the checkout apparatus is highly cost effective, since, subject to appropriate software changes being made, a conventional ATM which provides conventional ATM services forms a substantial part of the checkout apparatus.

In regard to the self-service checkout apparatus described herein by way of example with reference to the accompanying drawings, it will be appreciated that various improvements, changes and modifications can be made without departing from the true spirit and scope of the invention. Such improvements, changes and modifications within the skill of the art to which the present invention relates are intended to be covered by the appended claims.

For example, as a security feature of the checkout apparatus 10, the bag 32' in which purchased merchandise items are placed could be supported on a weighing scale, instead of being suspended from the rods 35. Using such an arrangement, each time an item is placed in the bag 32', the weight of the item as determined by the said weighing scale and communicated to the processing unit 60 is compared by the processing unit 60 with a known weight for the item as identified in a scanning or PLU entering operation. Also, in addition to the scanner/scale 16, a hand held bar code laser scanner could be provided at the apparatus for use in scanning bulky or awkwardly shaped items. Moreover, it is contemplated that the checkout apparatus 10 could include a cheque acceptor for enabling a customer to pay for purchased items by cheque.

Further, in regard to the itemization procedure, provision could be made for handling controlled items, such as alcoholic or tobacco items, in a special manner. For example, if a scanned item is identified as being a controlled item, an alerting signal could be sent by the processing unit 60 to the monitoring station so that a check can be made using the security camera 36 that the purchase is not being made by a juvenile.

In another alternative arrangement, the coin dispenser 24 could be omitted and, instead of providing change to a customer in the form of coins, alternative compensation in the form of a printed voucher or coupon of equivalent value could be provided by the ATM 20 to the customer for use in connection with a future self-service or cashier-assisted checkout transaction. Such voucher or coupon would be printed by the print means 54 and issued to the customer through the receipt slot 58.

We claim:

1. A checkout apparatus for processing items selected by a customer for purchase, the checkout apparatus comprising:

14

customer operated means for identifying each item selected for purchase;

an integrated self-service terminal including payment accepting means for enabling the customer to make payment for the purchased items, cash dispensing means for providing the customer with cash by way of change, and electronic control means connected to the customer operated means and for determining the price of each item identified by the customer operated means; the self-service terminal employing a display screen being arranged both to guide the customer through a merchandising transaction and to provide to the customer an indication of the total amount to be paid by the customer for the purchased items; and

the self-service terminal providing at least one of a number of automated teller machine (ATM) services independently of the processing of items selected for purchase, the number of ATM services including (i) allowing a customer to withdraw cash from a bank account, (ii) allowing a customer to shift money between bank accounts, and (iii) allowing a customer to check the amount of money in a bank account.

2. A checkout apparatus according to claim 1, wherein the payment accepting means includes card reading means for enabling a customer to make payment of the total price by means of a debit card or credit card, the card reading means also being arranged to read a customer identifying card used by a customer when carrying out an ATM transaction before the processing of items selected for purchase.

3. A checkout apparatus according to claim 1, further comprising a signature pad for providing a digitized representation of a customer's signature, the digitized representation being stored by the electronic control means.

4. A checkout apparatus according to claim 1, wherein the payment accepting means also includes a currency note acceptor means for enabling a customer to make payment of the total price by cash.

5. A checkout apparatus according to claim 1, wherein the self-service terminal includes a coin dispenser arranged to dispense change due to a customer who has made payment.

6. A checkout apparatus according to claim 1, further comprising a security gate which normally closes a customer exit from the checkout apparatus, the electronic control means being arranged to open the security gate in response to payment by a customer, means being provided for bringing about closure to the security gate after the customer has passed through the exit away from the checkout apparatus.

7. A checkout apparatus according to claim 2, wherein the card reading means is arranged to read a further customer identifying card used by a customer at the commencement of a checkout transaction.

8. A self-checkout apparatus for processing items selected by a customer for purchase, and a customer operated bar code scanner for identifying each item selected for purchase, the self-checkout apparatus comprising:

a self-service terminal providing integrated automated teller machine and point of sale functionality which includes a payment accepting mechanism for enabling the customer to make payment for the purchased items, a cash dispenser arranged to provide the customer with cash by way of change or as part of an automated teller machine transaction, and an electronic controller which is connected to said customer operated bar code scanner and which is arranged to determine the price of each item identified by said customer operated barcode scanner, said self-service terminal being arranged to provide to the customer an indication of the total amount to be paid by the customer for the purchased items; and

15

a common display screen arranged to display messages for guiding a customer through both checkout transactions, and automated teller machine transactions.

9. The self-checkout apparatus of claim 8, wherein said customer bar code scanner comprises a laser scanner arranged to scan a bar code carried by an item to be purchased and arranged to send a signal identifying the scanned item to said electronic controller, said electronic controller being further operable to cause said common display screen to display an identification of the scanned item together with its price as items are scanned.

10. The self-checkout apparatus of claim 8 further comprising a scale for weighing an item to be purchased, said scale being operative to send to said electronic controller a signal indicative of the weight of the weighed item; and a customer operated data entry mechanism for enabling the customer to key in data identifying the weighed item, said electronic controller being further operable to cause said common display screen to display an identification of the weighed item together with its price as the customer keys in data identifying weighed items.

11. The self-checkout apparatus of claim 10, wherein said electronic controller is further operable to cause said common display screen to display to a customer information enabling the customer to determine a code identifying the weighed item.

12. The self-checkout apparatus of claim 8, wherein said self-service terminal provides automated teller machine (ATM) services independently of the processing of items selected for purchase.

13. The self-checkout apparatus of claim 8, wherein said self-service terminal includes a printer arranged to print a receipt listing all items purchased by a customer together with the prices of the items purchased and the total price payable by the customer, said self-service terminal being arranged to issue said receipt to the customer in response to the payment by the customer of said total price using a payment acceptor.

14. The self-checkout apparatus of claim 13 wherein said printer is also operable to printout a receipt for an automated teller machine transaction.

15. The self-checkout apparatus of claim 8, further comprising a payment acceptor which includes a card reader for enabling a customer to make payment by means of a debit card or credit card, said card reader also being arranged to read a customer identifying card used by a customer when carrying out an ATM transaction independently of the processing of items selected for purchase.

16. The self-checkout apparatus of claim 8, further comprising a signature pad for providing a digitized representation of a customer's signature, said digitized representation being stored by said electronic controller in a memory.

17. The self-checkout apparatus of claim 15, wherein said payment acceptor also includes a currency note acceptor for enabling a customer to make payment of said total price by cash.

18. The self-checkout apparatus of claim 8, wherein said terminal further comprises a coin dispenser arranged to dispense change due to a customer.

19. The self-checkout apparatus of claim 8, further comprising a security gate which normally closes a customer exit from said self-checkout apparatus, said electronic controller being operable to open said security gate in response to payment by a customer.

20. The self-checkout apparatus of claim 15, wherein said card reader is further operable to read a further customer

16

identifying card used by a customer at the commencement of a checkout transaction, and said electronic controller is operable so that a checkout transaction will only be enabled if the further customer identifying card is successfully read.

21. The self-checkout apparatus of claim 8, wherein said self-service terminal further comprises a coupon acceptor which is connected to said electronic controller and which is operable to read information carried on a predetermined type of coupon inserted in said coupon acceptor by a customer, said electronic controller being arranged to adjust the total amount payable by the customer in response to information read by said coupon acceptor.

22. The self-checkout apparatus of claim 8, further comprising a video surveillance camera connected to a remote monitoring station and arranged to survey a checkout transaction carried out by a customer using said self-checkout apparatus.

23. A method of completing both banking and sales transactions in a retail establishment utilizing an integrated self-service checkout terminal comprising the steps of:

displaying a first set of instructions on a common display of the integrated self-checkout terminal while the integrated self-service checkout terminal is in an idle state;

recording an indication by the customer to start the transaction by an input device in the integrated self-service checkout terminal;

displaying on the common display a second set of instructions for the customer to indicate whether the customer wishes to make the transaction a banking transaction or a shopping transaction;

recording a response by the customer by the input device; and

completing the transaction by the integrated self-checkout terminal.

24. The method of claim 23, wherein, if the response is a shopping transaction, the step of completing the transaction comprises the steps of:

displaying a third set of instructions on the common display for instructing the customer how to enter items including a last item into the transaction by scanning them with a bar code reader, weighing them with a scale, or using the input device;

recording the entry of items including the last item into the transaction in response to scanning, weighing, or using the input device;

displaying a fourth set of instructions on the common display in response to the last item being recorded for instructing the customer to choose one of a number of methods of paying for the items, the methods of paying including cash and credit;

recording the entry of a payment choice of the customer; and

receiving payment from the customer using the chosen method of payment by the integrated self-checkout terminal.

25. The method of claim 23, wherein, if the response is a banking transaction, the step of completing comprises the steps of:

displaying a third set of instructions on the common display for instructing the customer how to complete the banking transaction;

displaying a fourth set of instructions on the display to choose one of a number of types of banking transactions, including cash deposit and cash withdrawal transactions;

17

recording a customer choice of type of banking transaction by the integrated self-checkout terminal;
 completing the chosen type of banking transaction by the integrated self-checkout terminal;
 displaying a fifth set of instructions for the customer to indicate whether the customer wishes to conduct a shopping transaction; and
 recording a response by the customer entered utilizing the input device.

26. The method of claim 23, further comprising the steps of:

opening a security gate after the transaction is completed; and

18

displaying the first set of instructions on the common display of the integrated self-checkout terminal to return to an idle state.

27. The method of claim 23 further comprising the step of: printing both banking and shopping transaction receipts utilizing a single printer in the integrated self-service checkout terminal.

28. The method of claim 23 further comprising the step of: entering transaction data for both banking and shopping transaction utilizing a single data entry device in the integrated self-service checkout terminal.

* * * * *

RELATED PROCEEDINGS APPENDIX

None

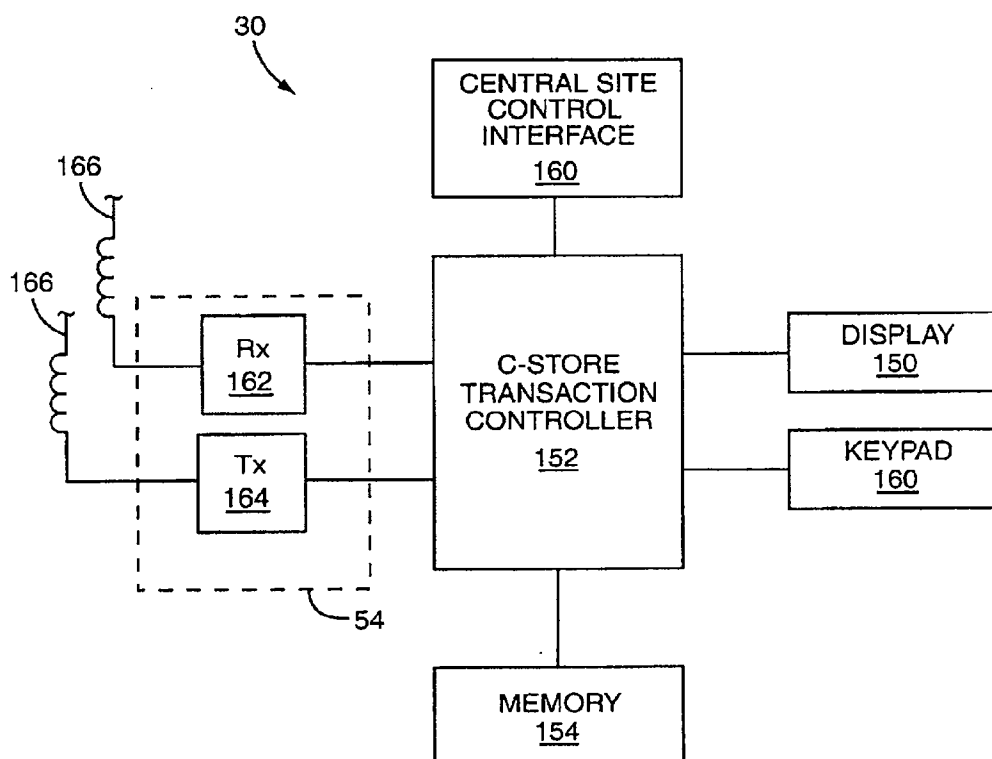


FIG. 6

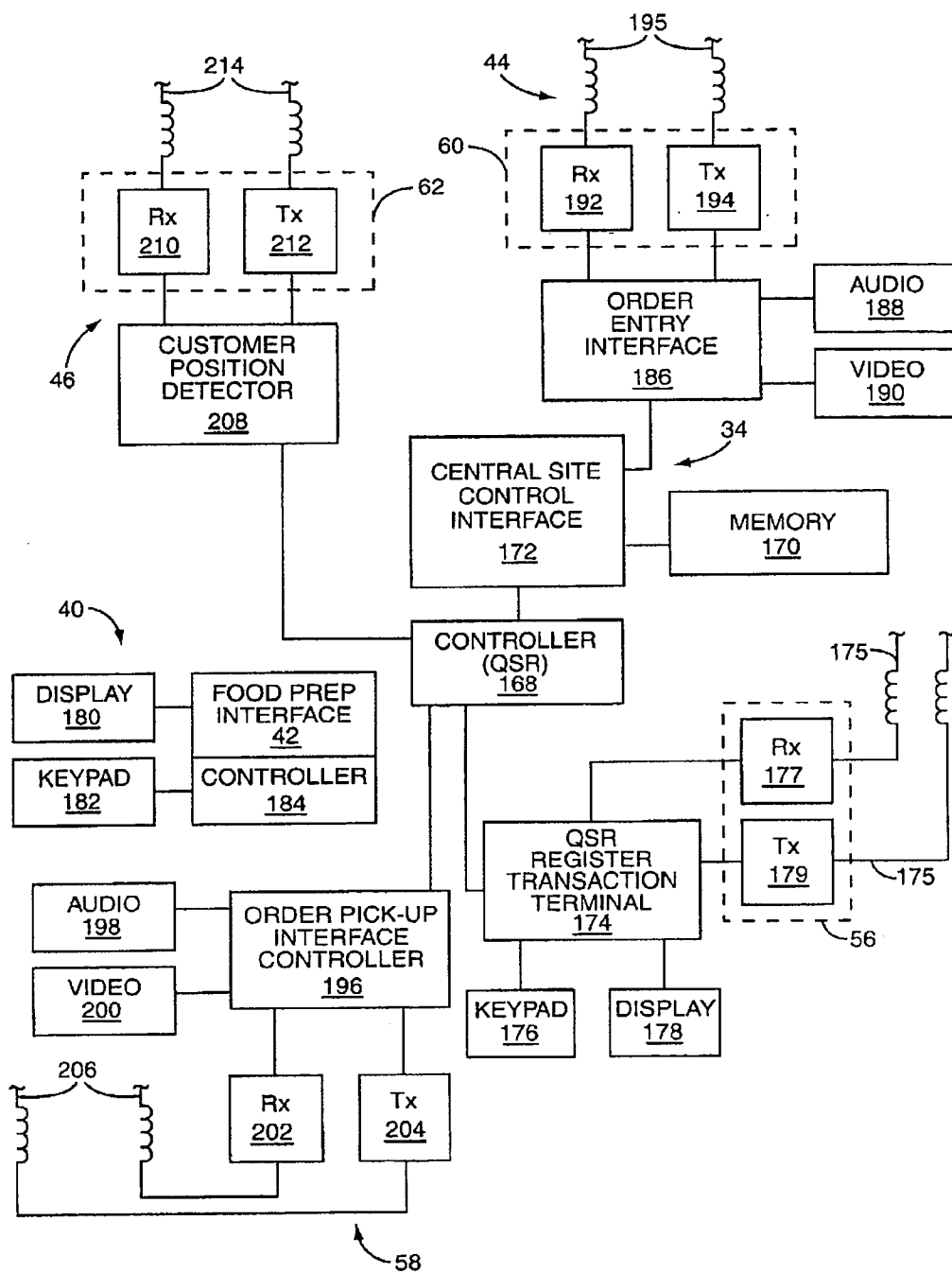
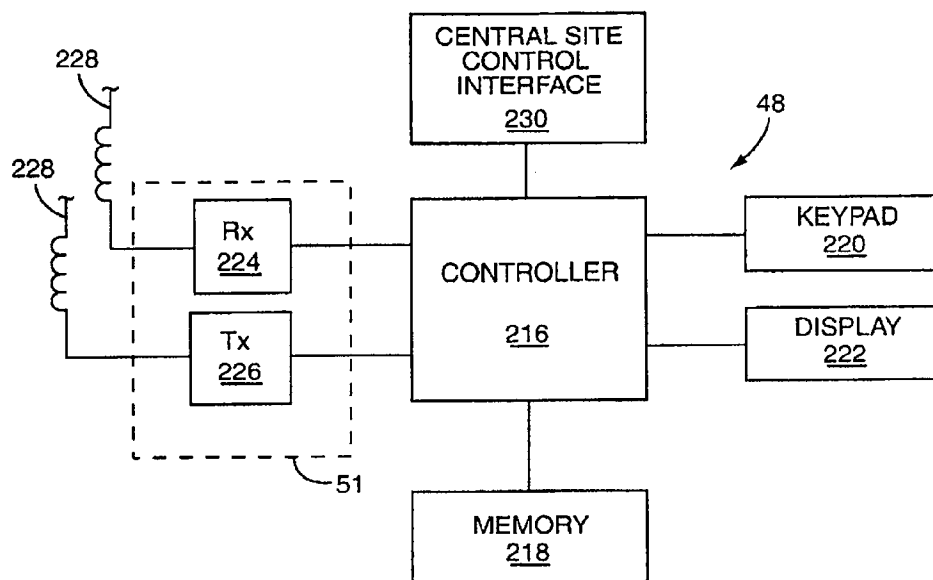
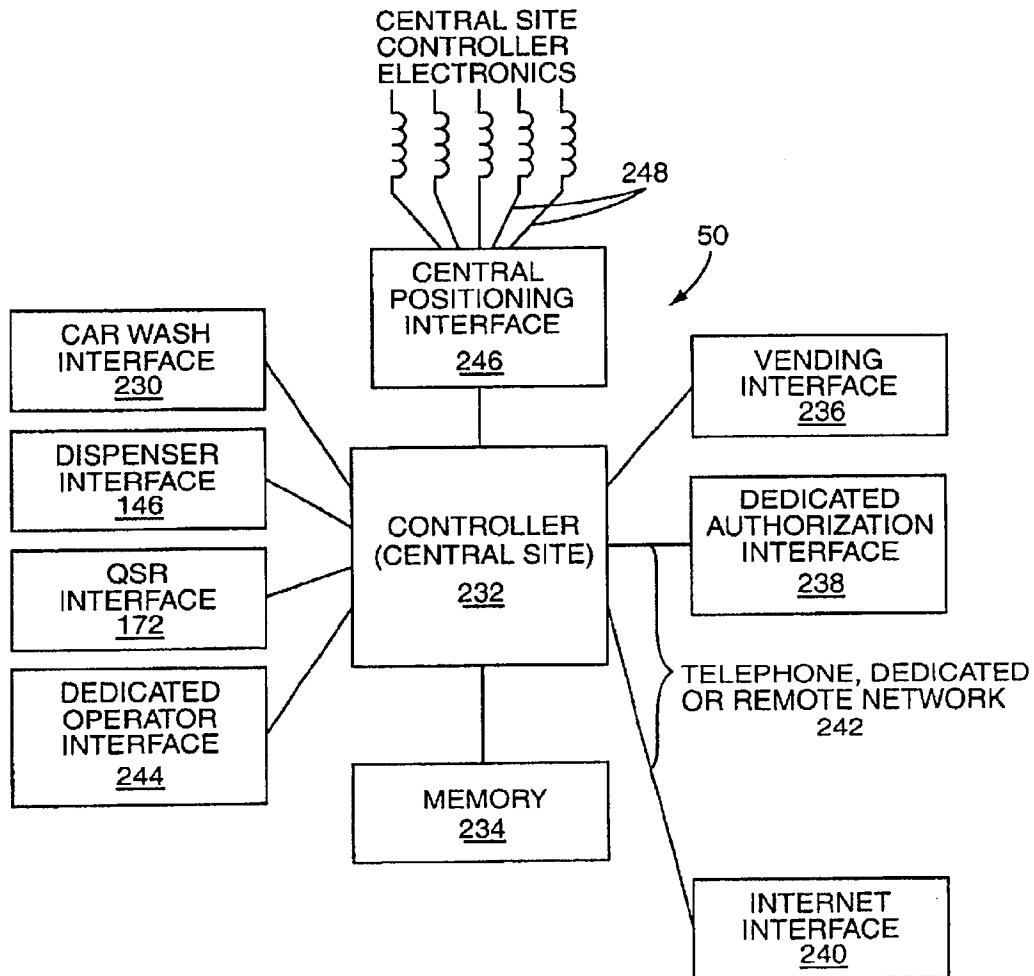
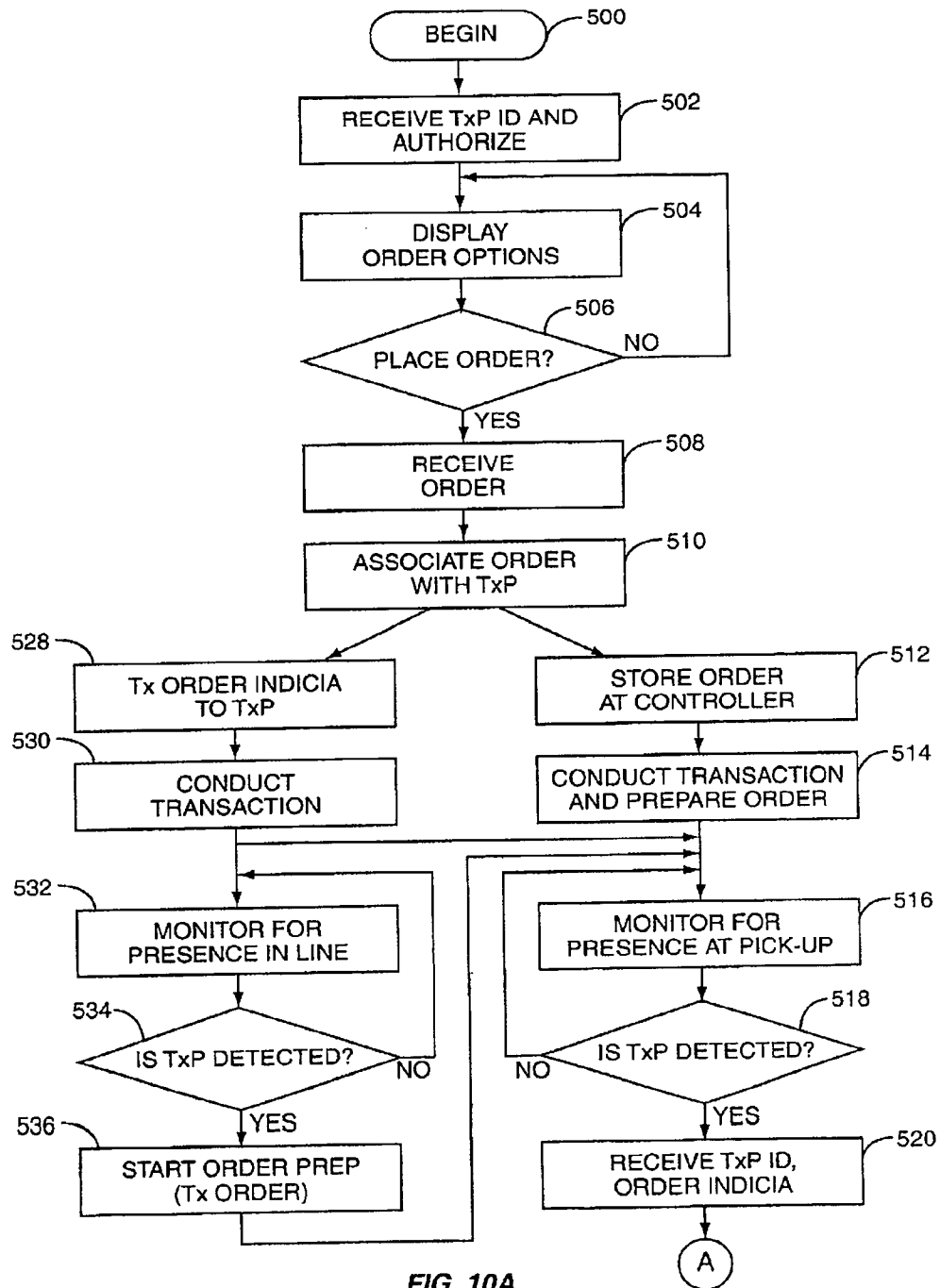
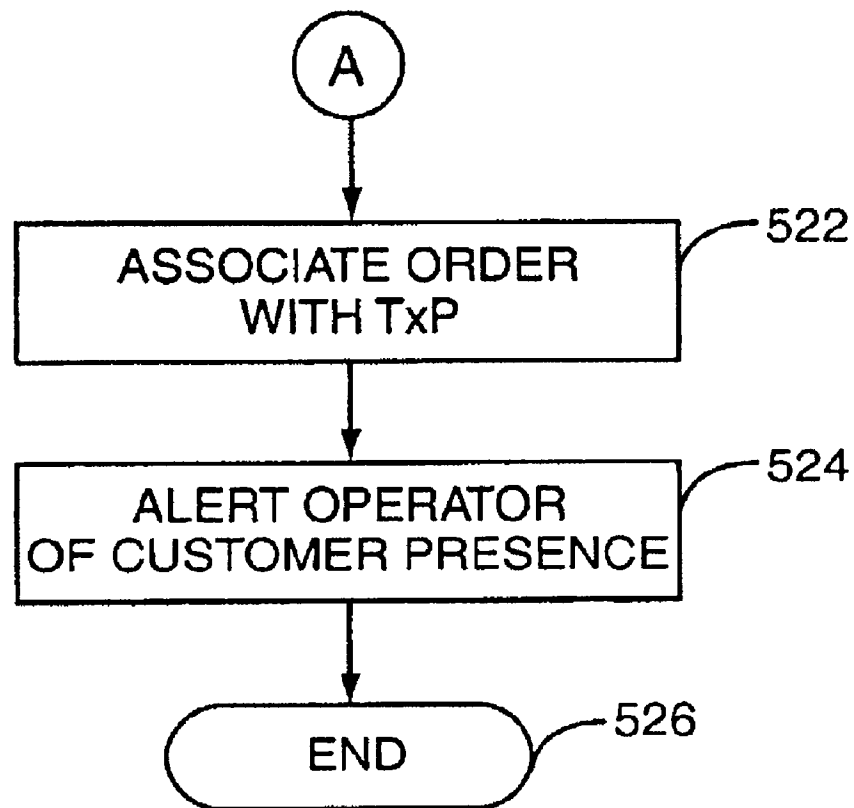


FIG. 7

**FIG. 8**

**FIG. 9**



**FIG. 10B**

LOYALTY BENEFITS

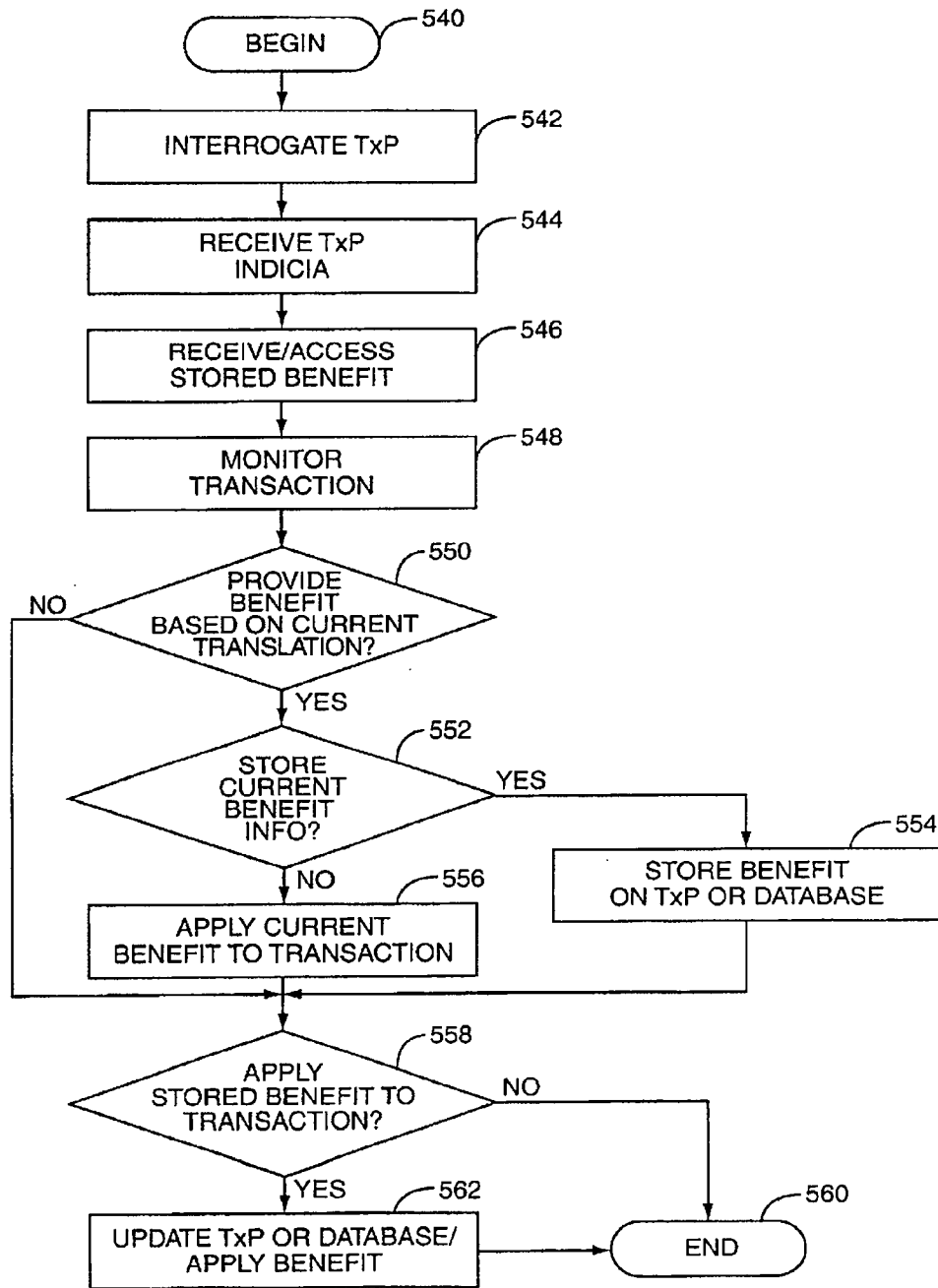


FIG. 10C

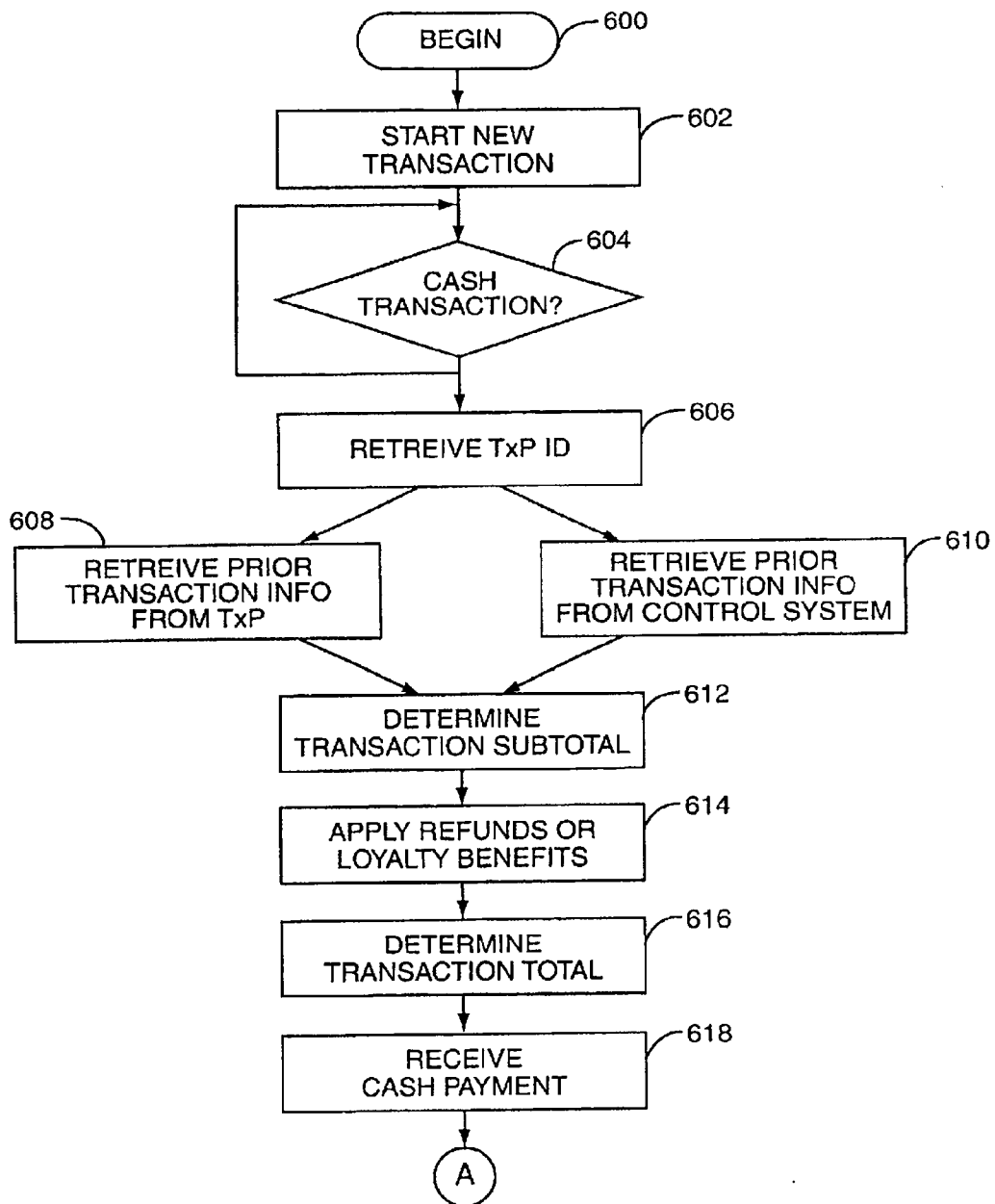
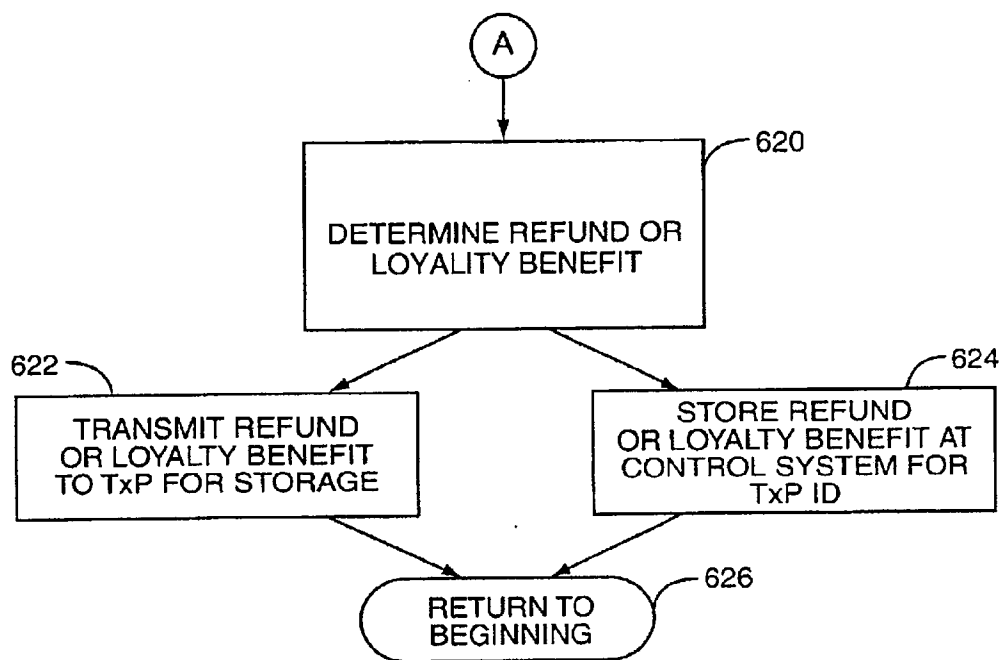
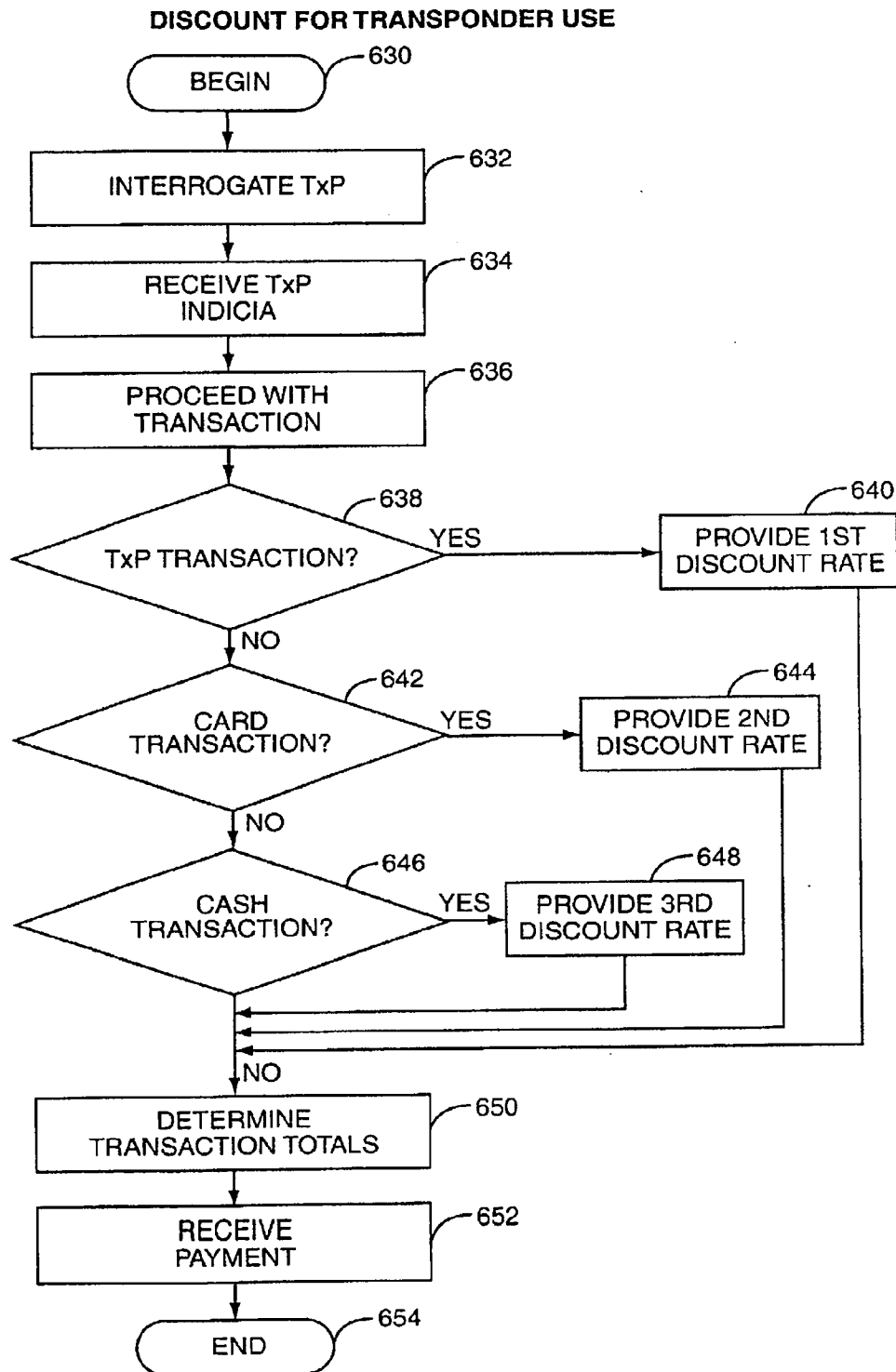


FIG. 11A

**FIG. 11B**

**FIG. 11C**

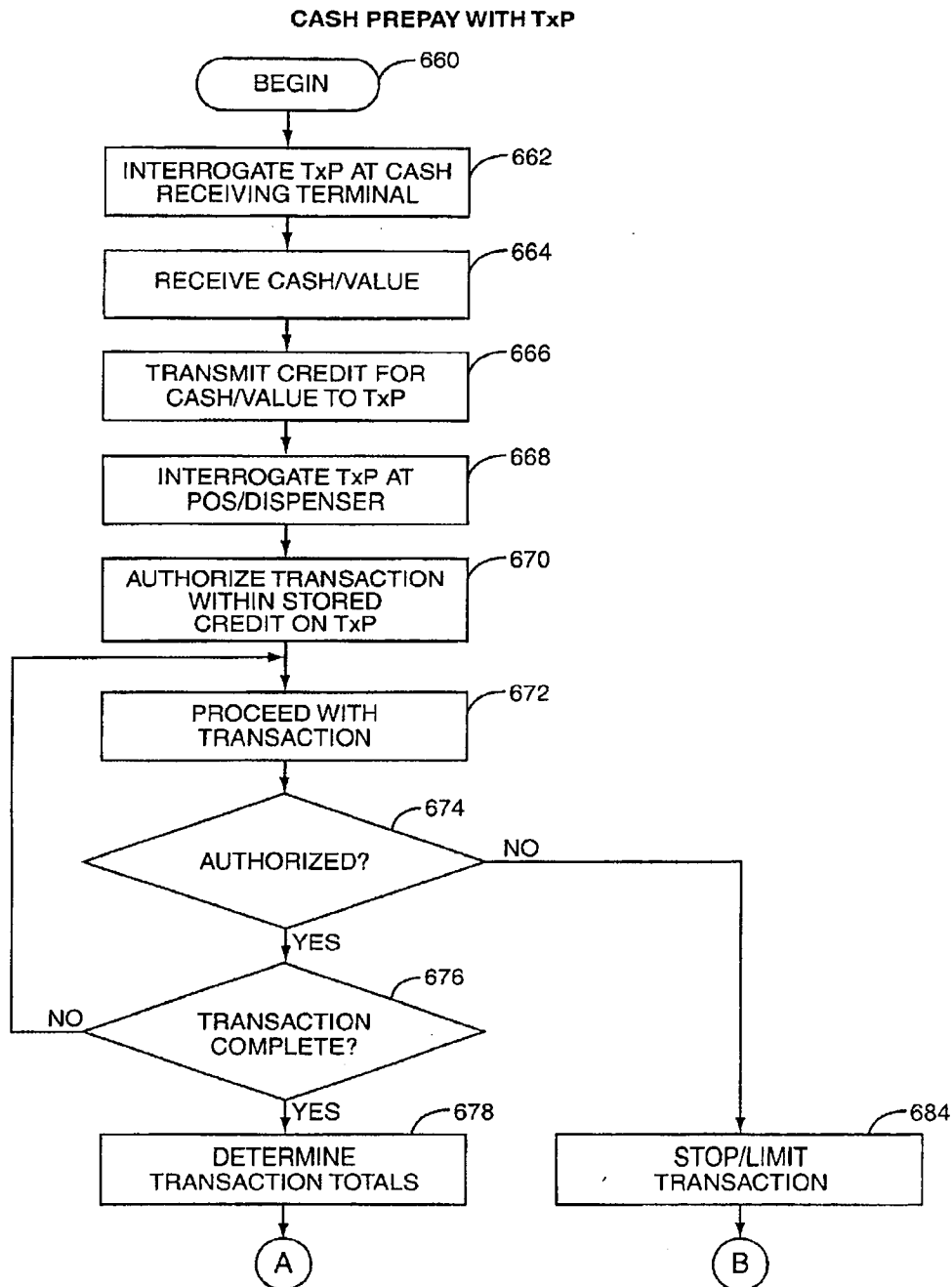
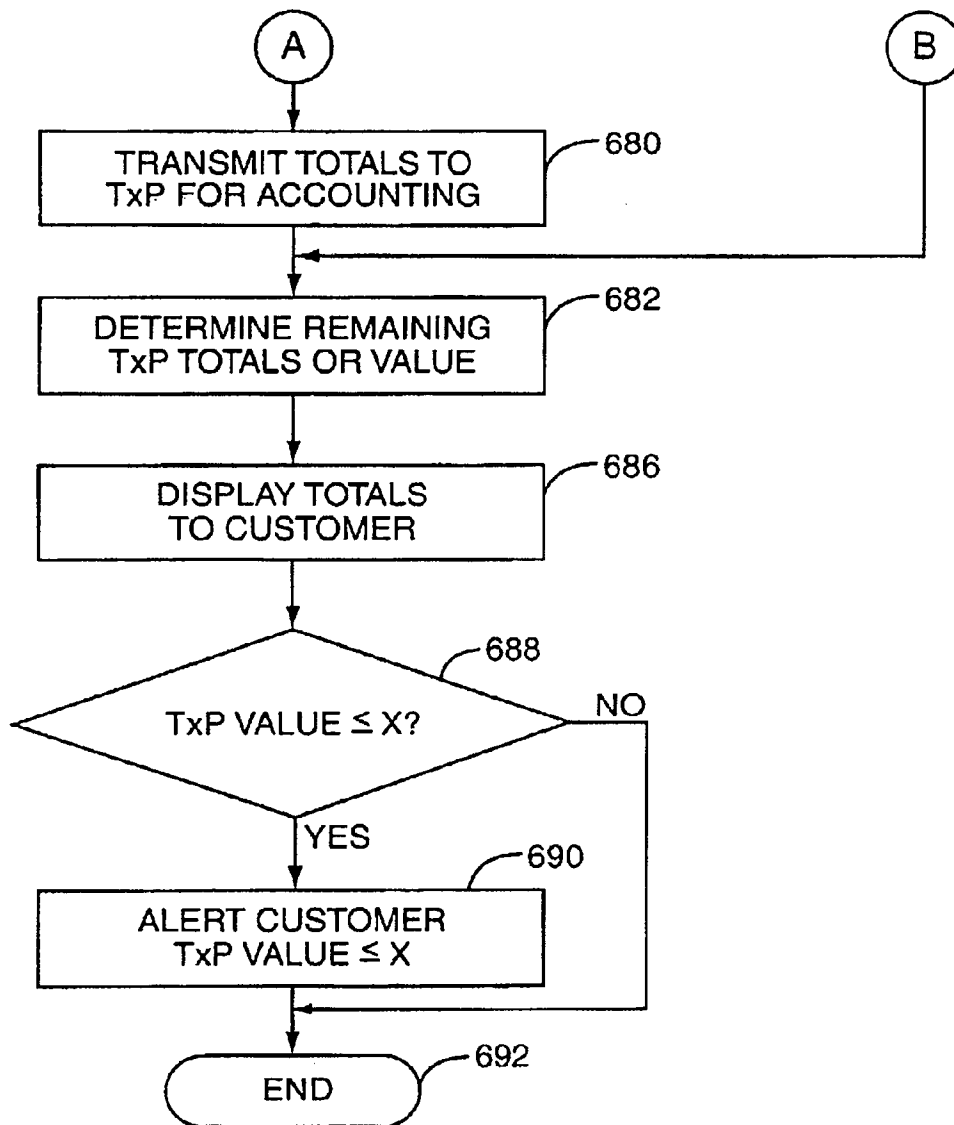
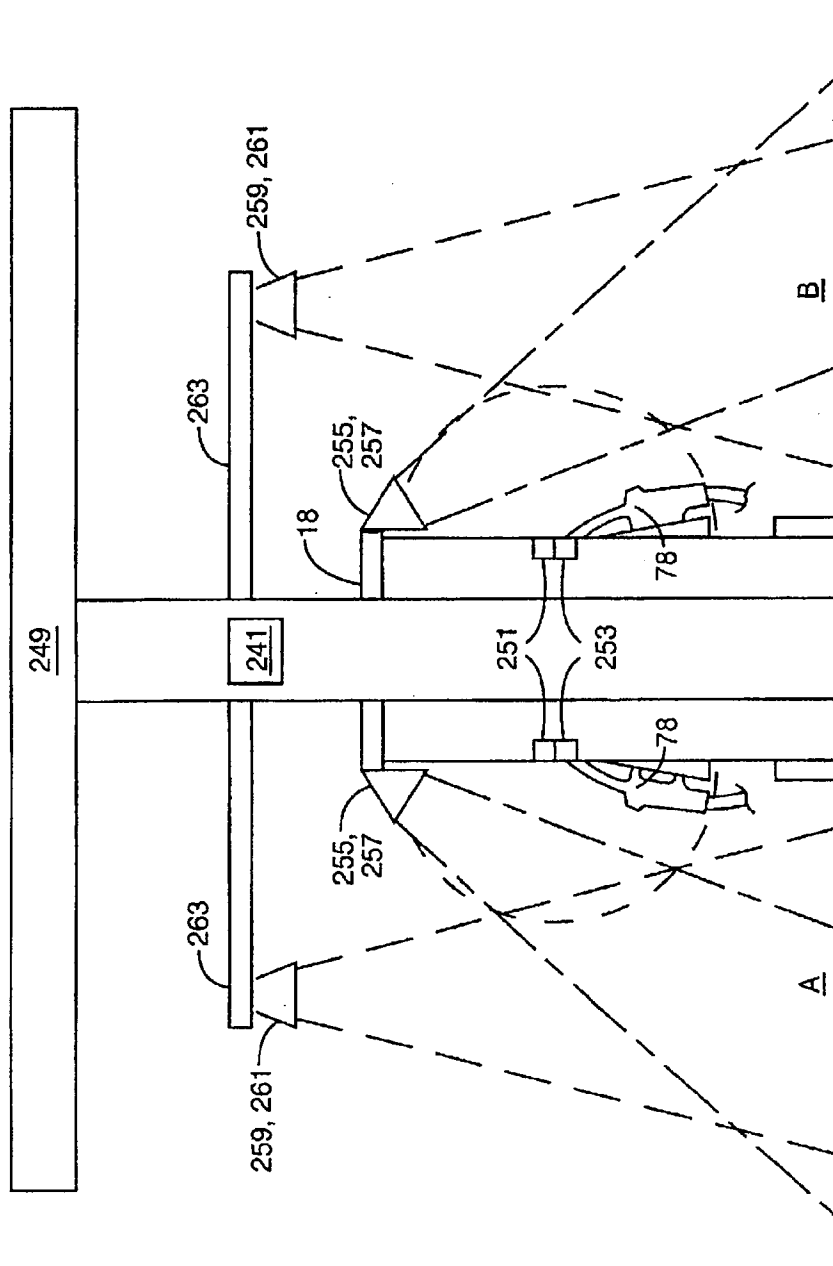


FIG. 11D

**FIG. 11E**



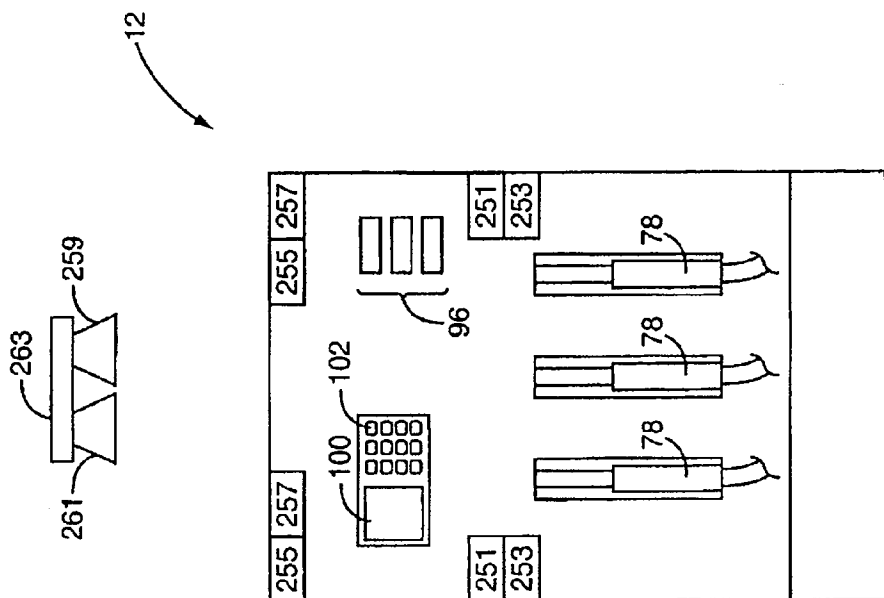


FIG. 12B

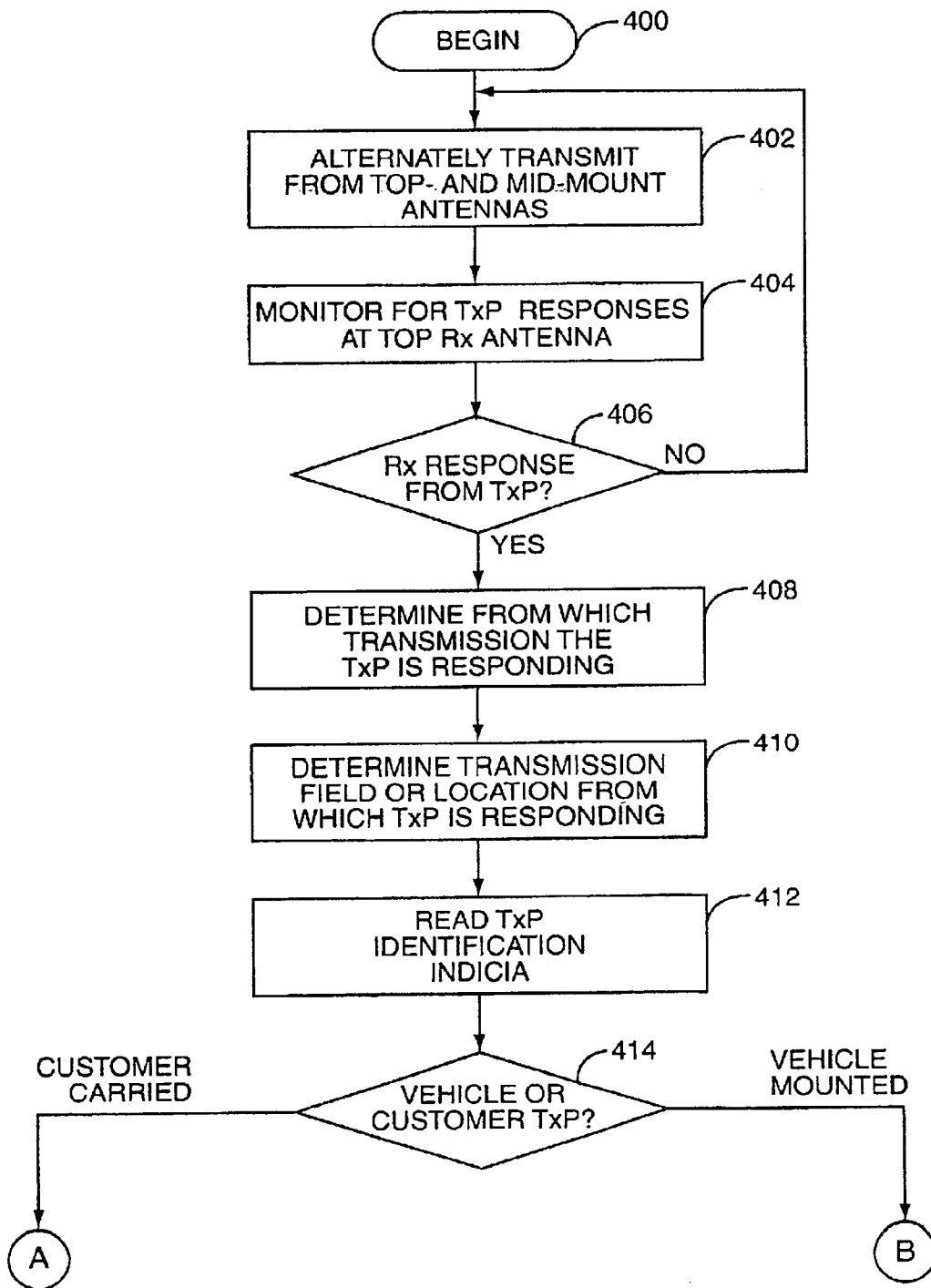


FIG. 12C

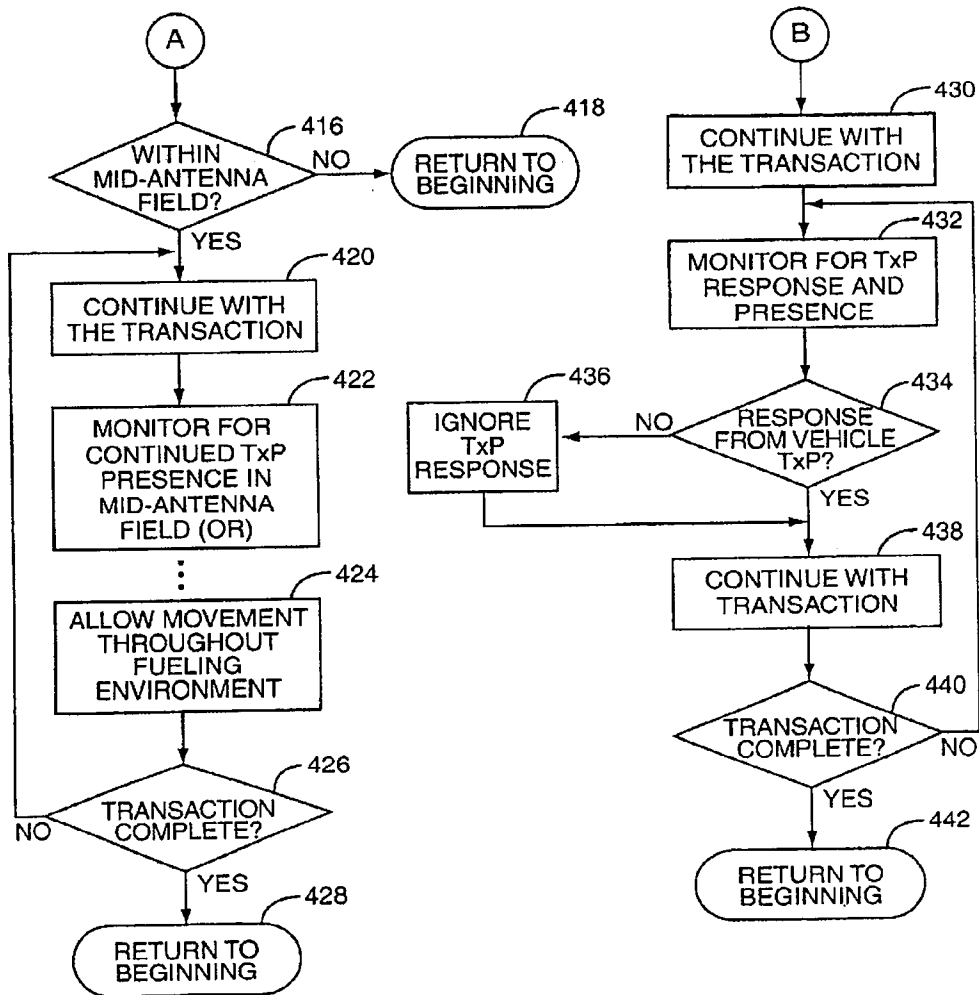


FIG. 12D

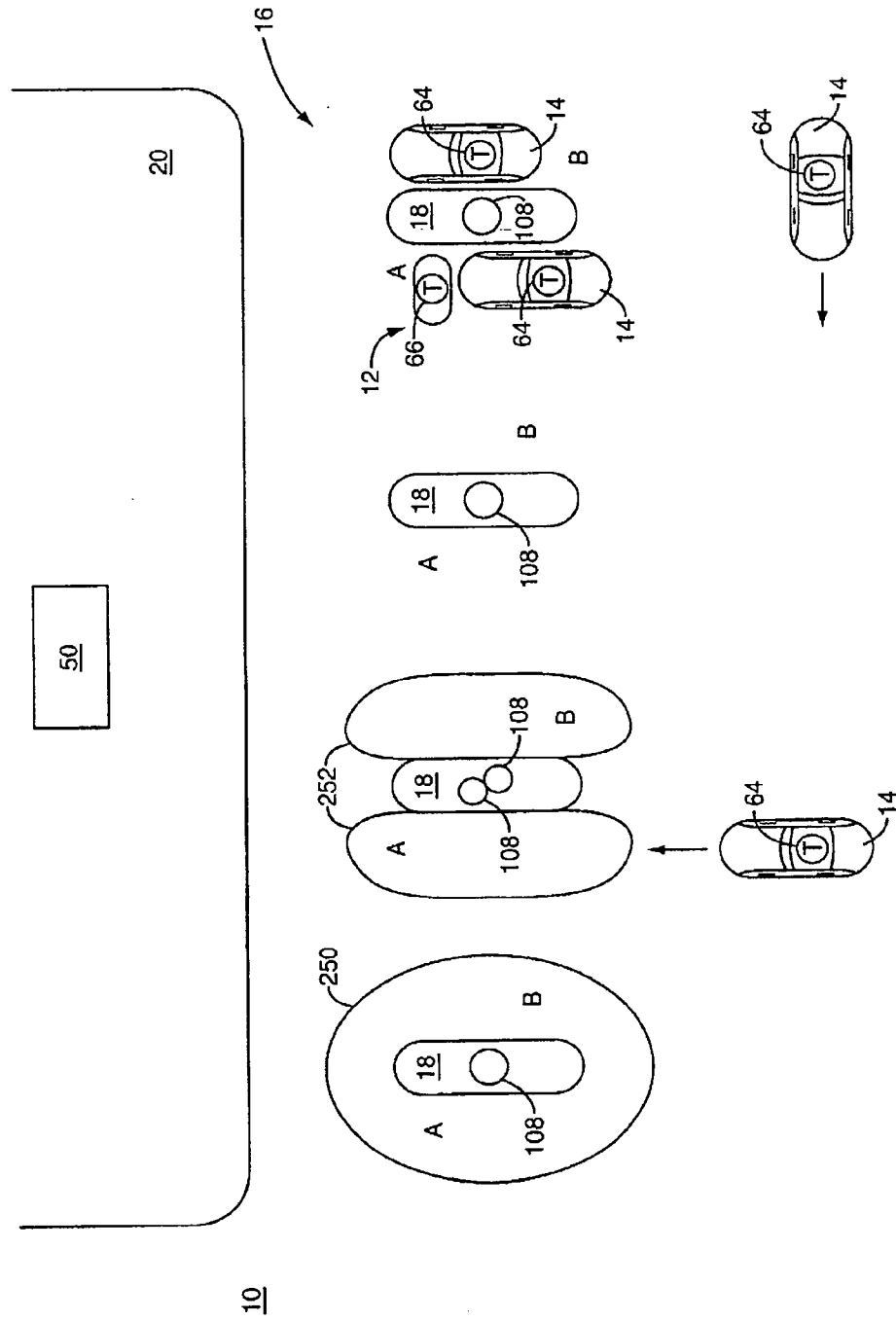


FIG. 13A

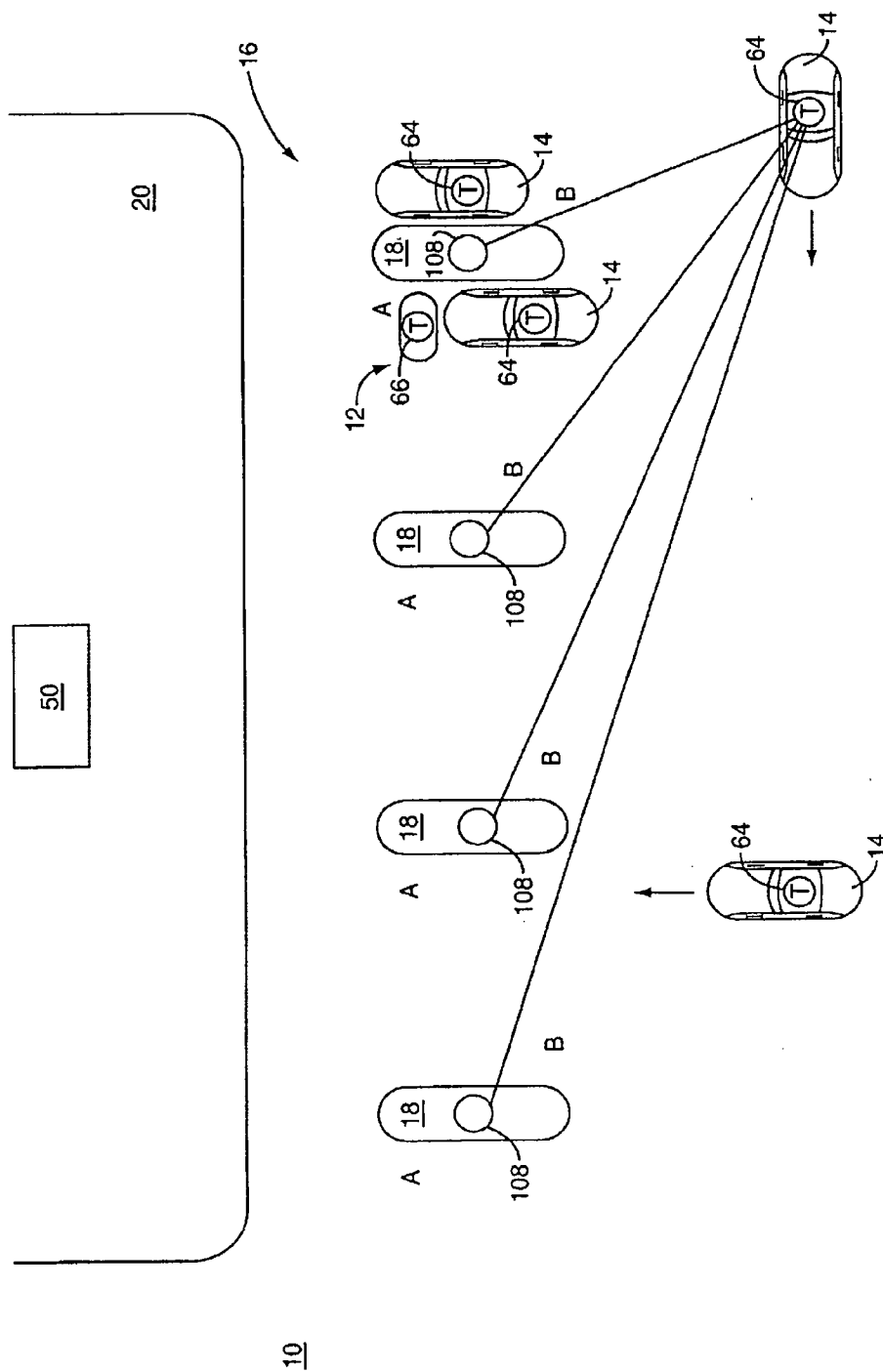
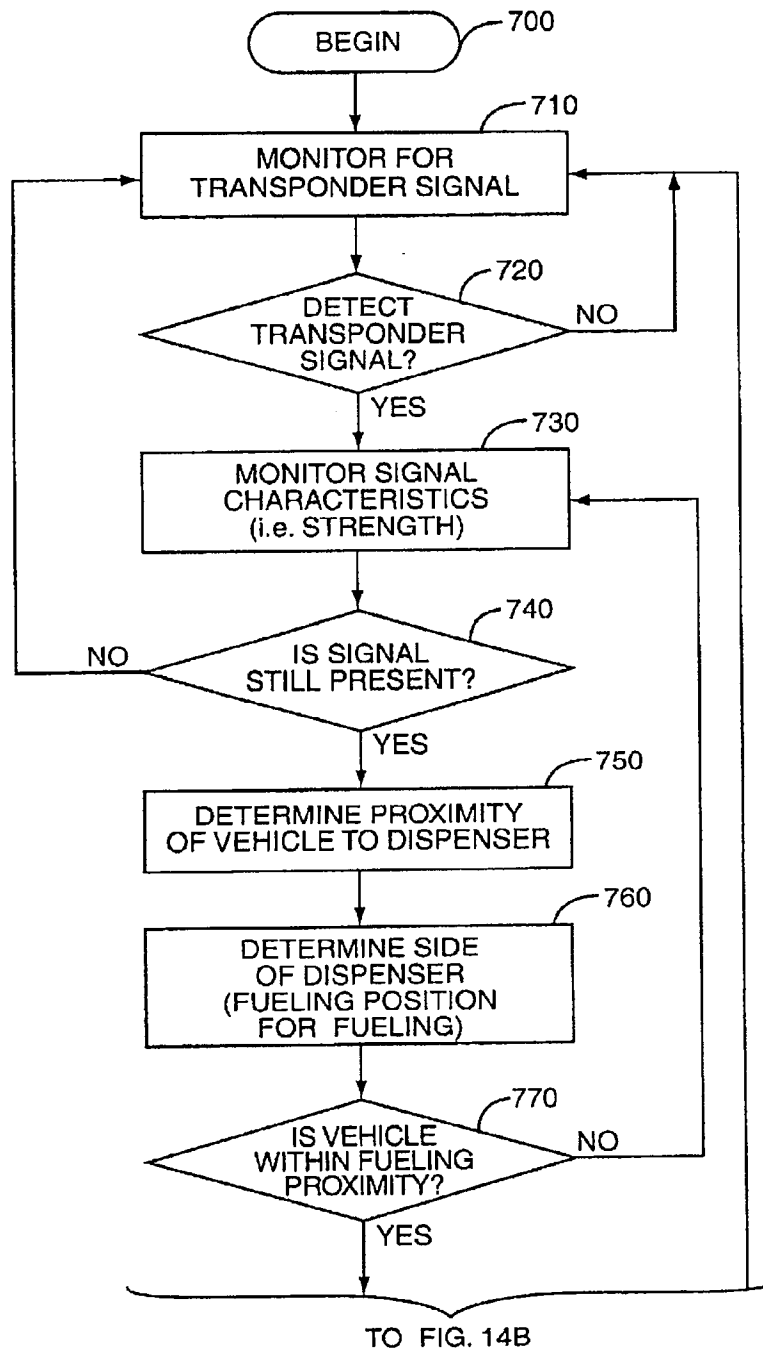
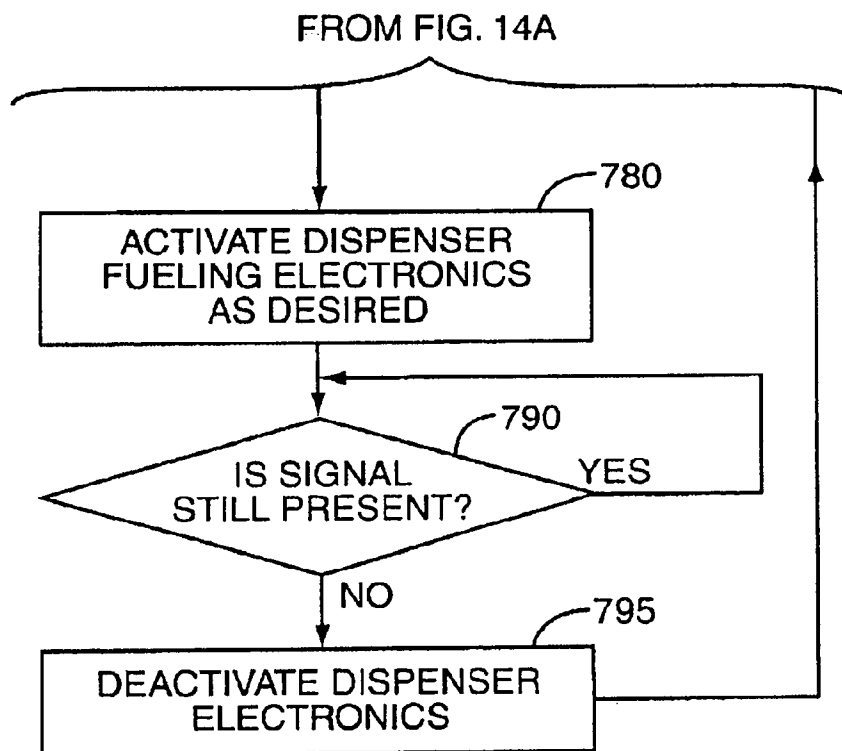


FIG. 13B

**FIG. 14A**

**FIG. 14B**

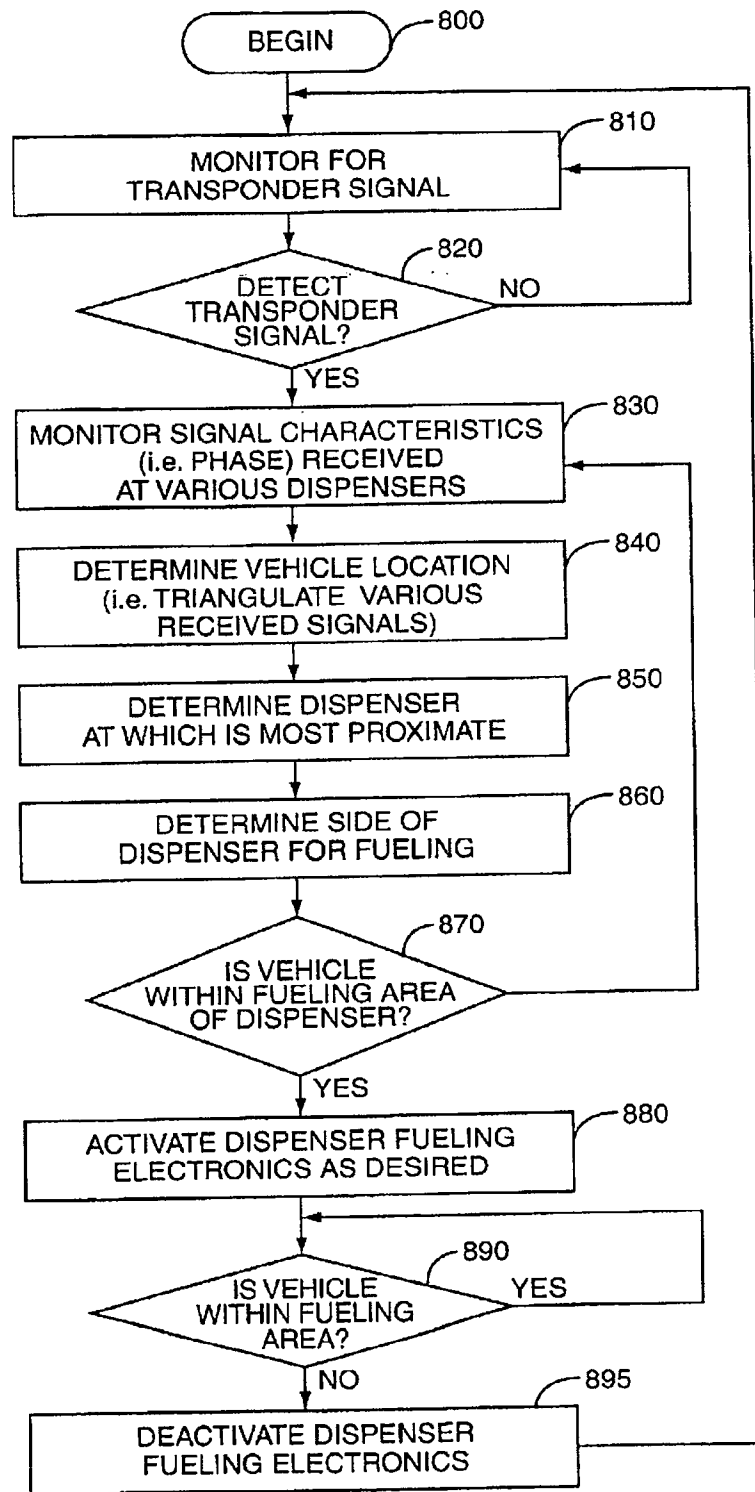


FIG. 15

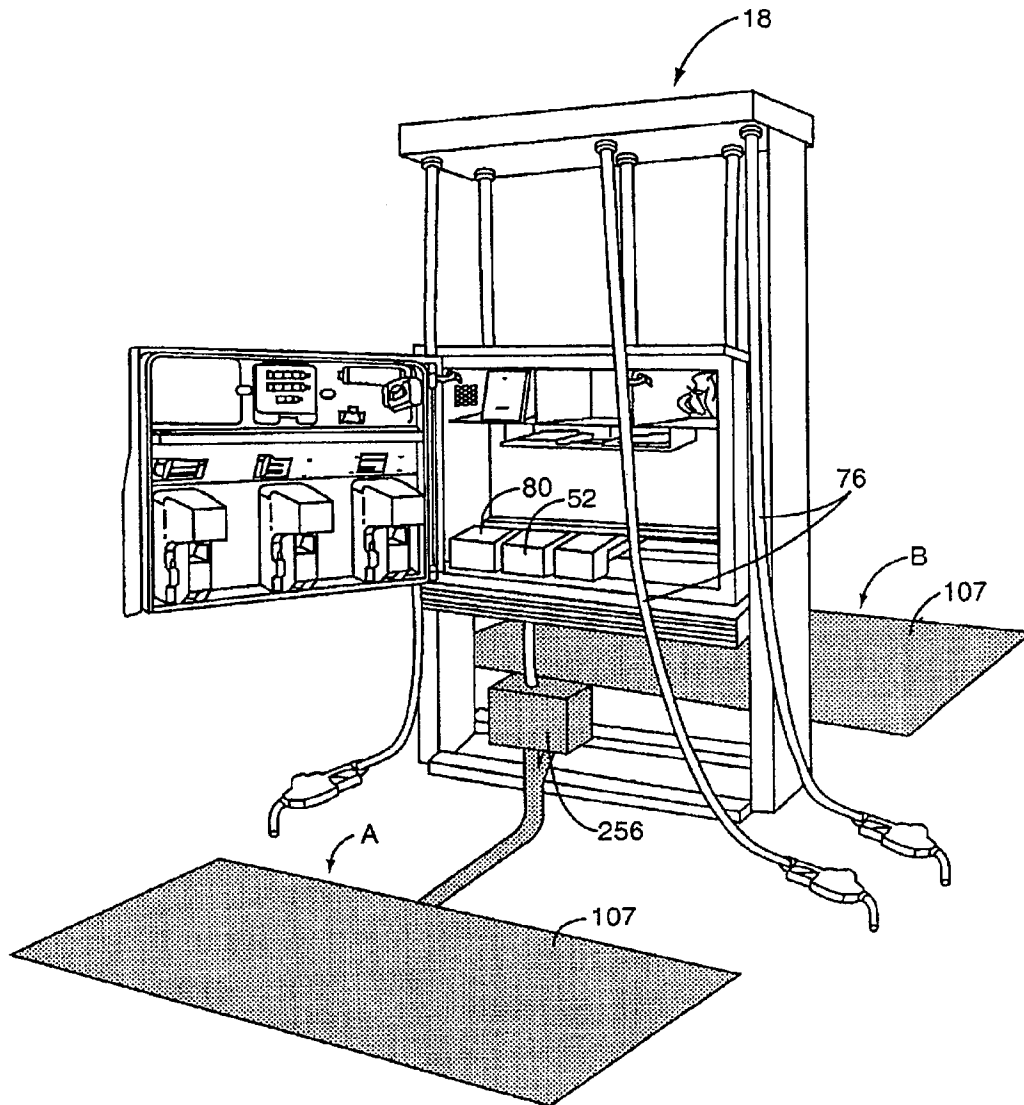


FIG. 16

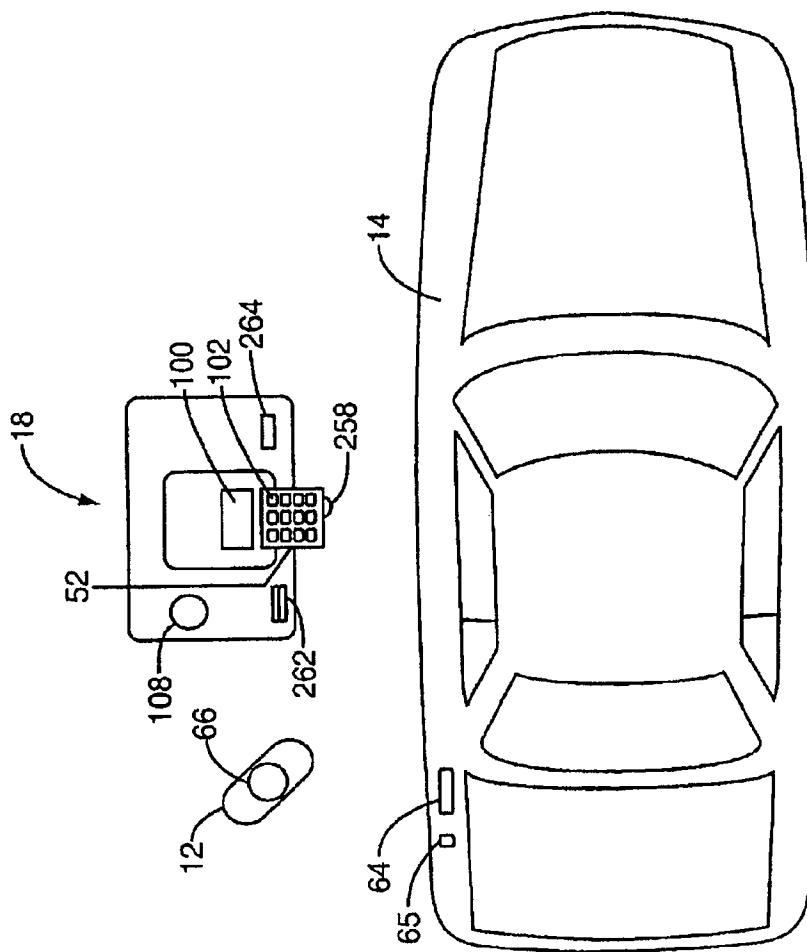


FIG. 17

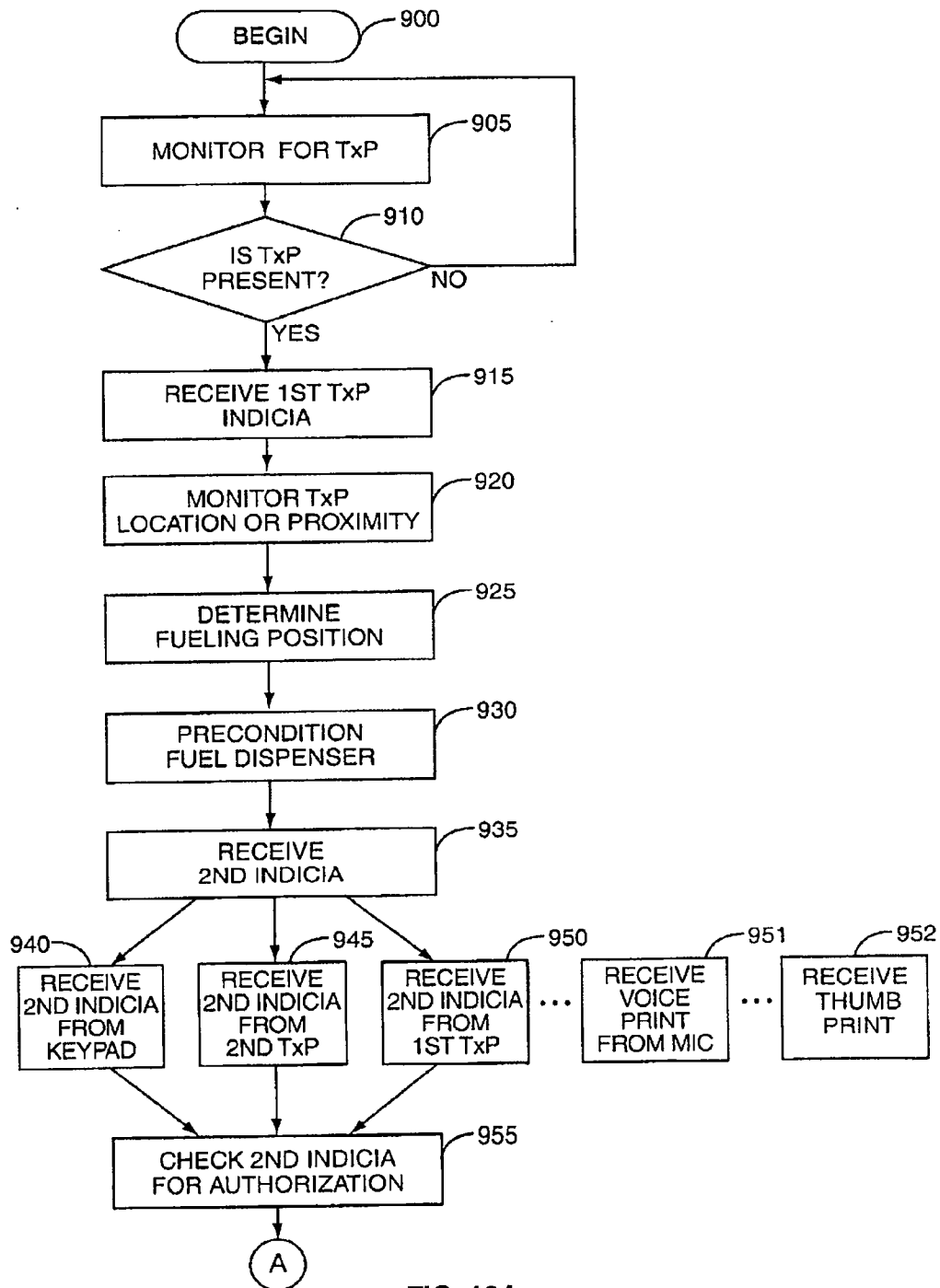
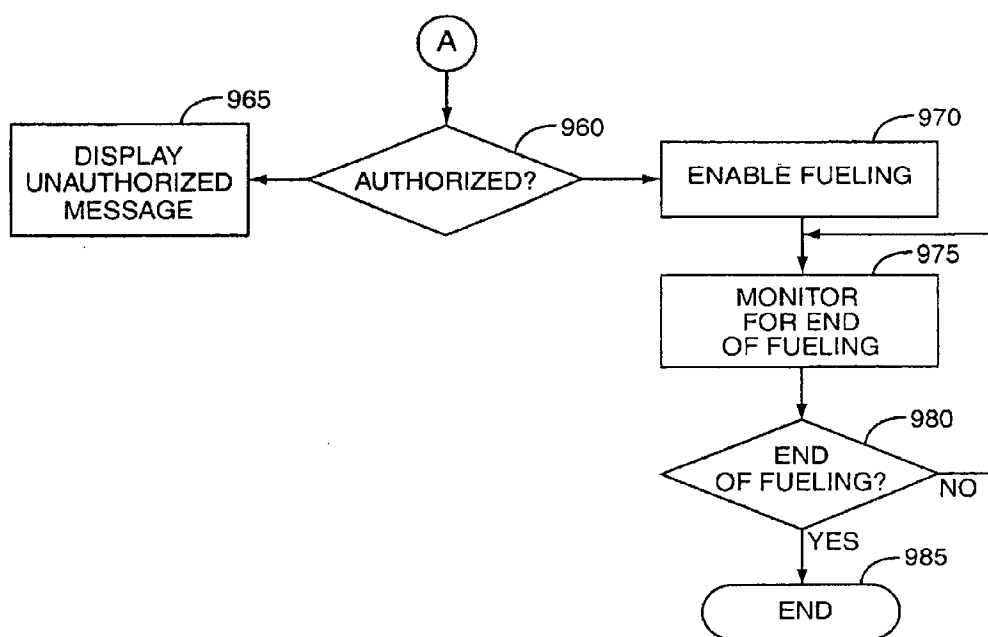


FIG. 18A

**FIG. 18B**

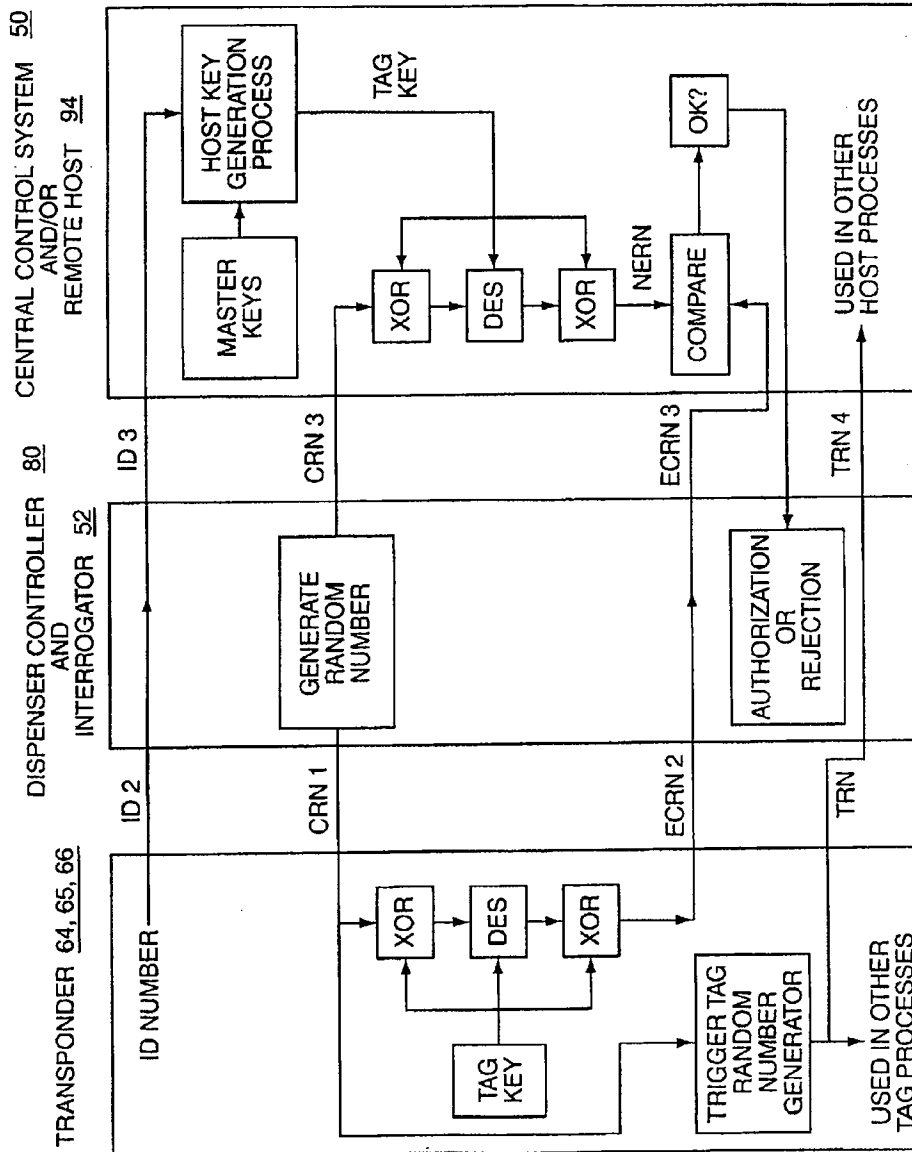


FIG. 19

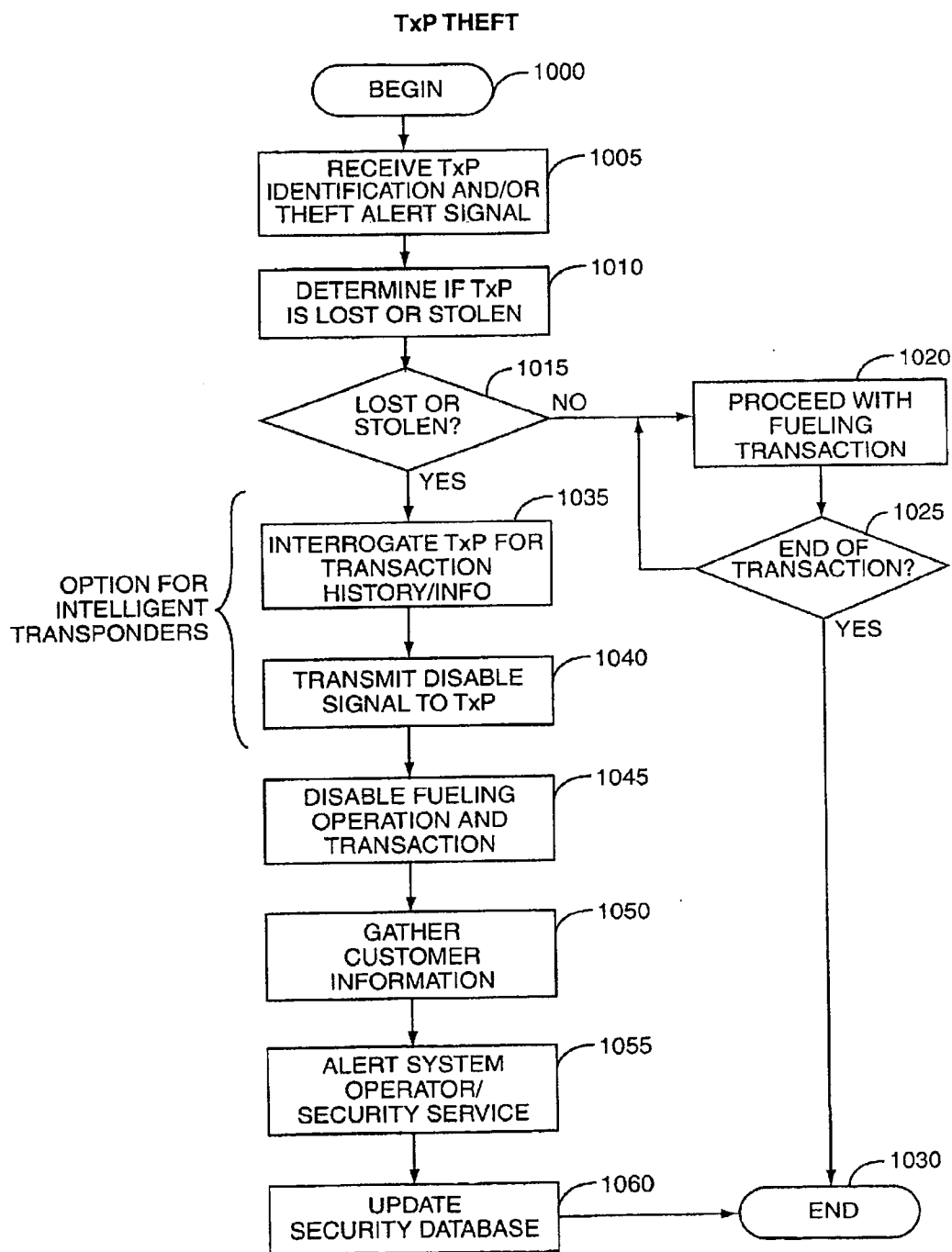
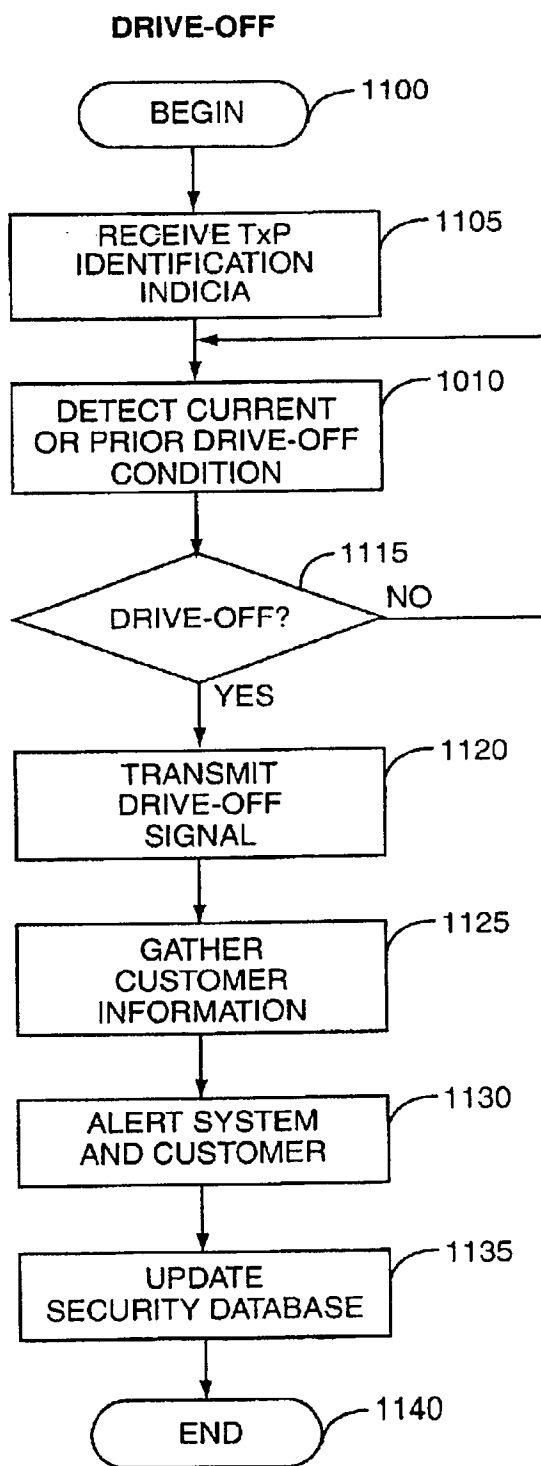


FIG. 20

**FIG. 21**

TRANSACTION LIMITATIONS

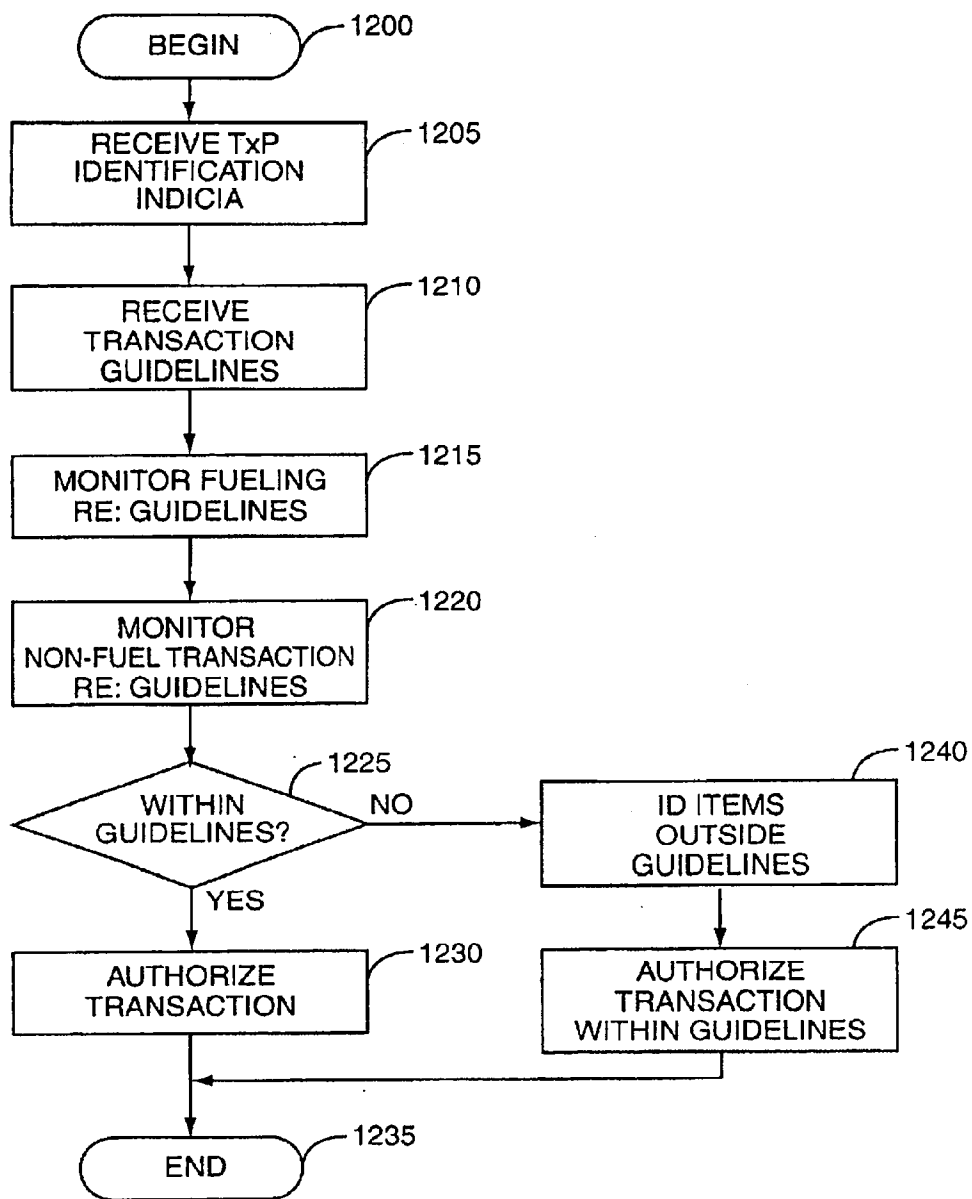


FIG. 22

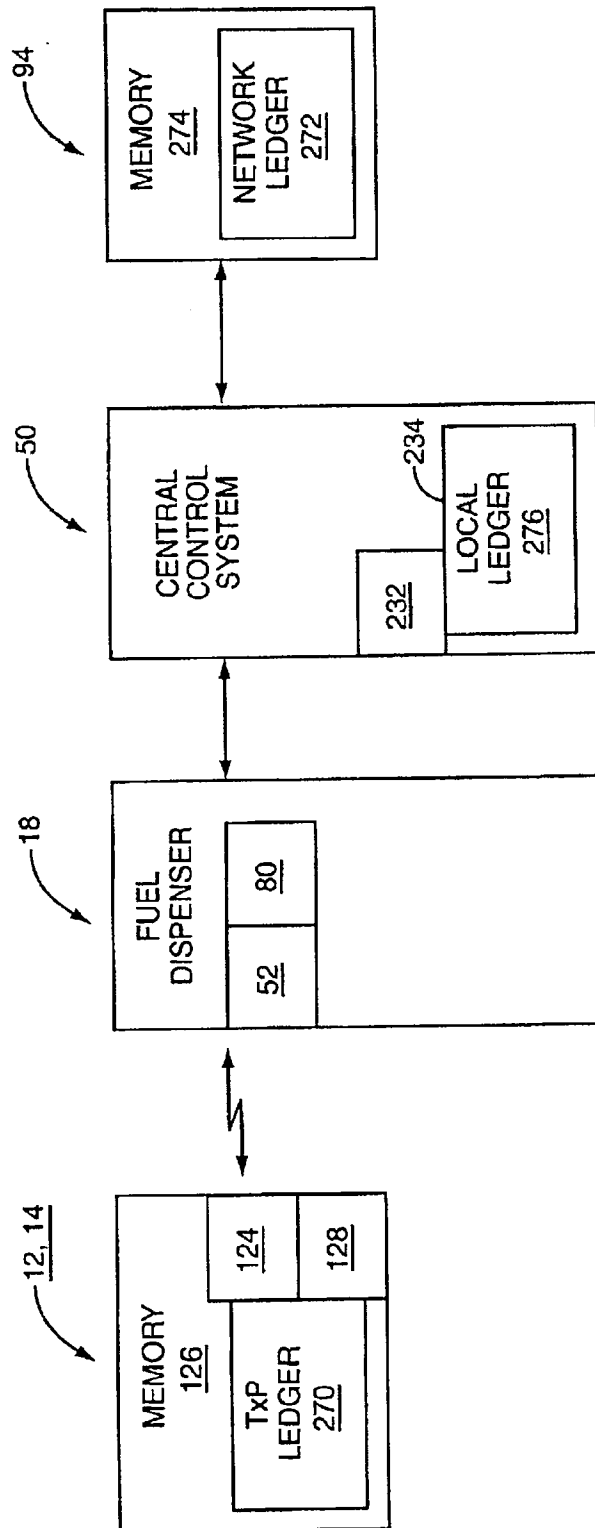
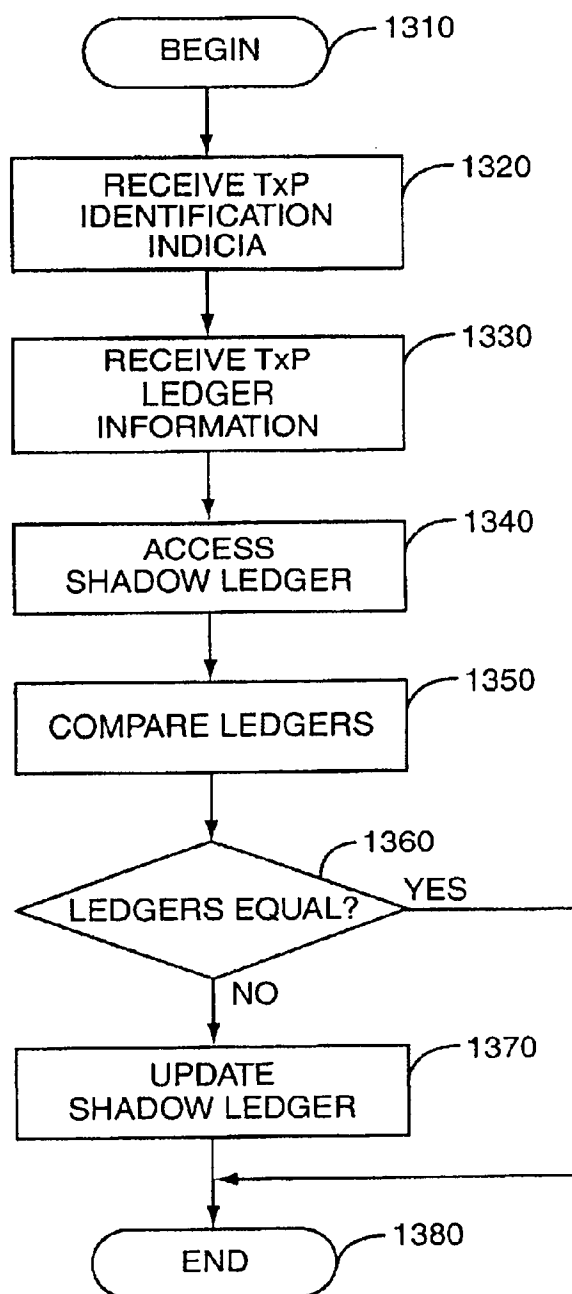
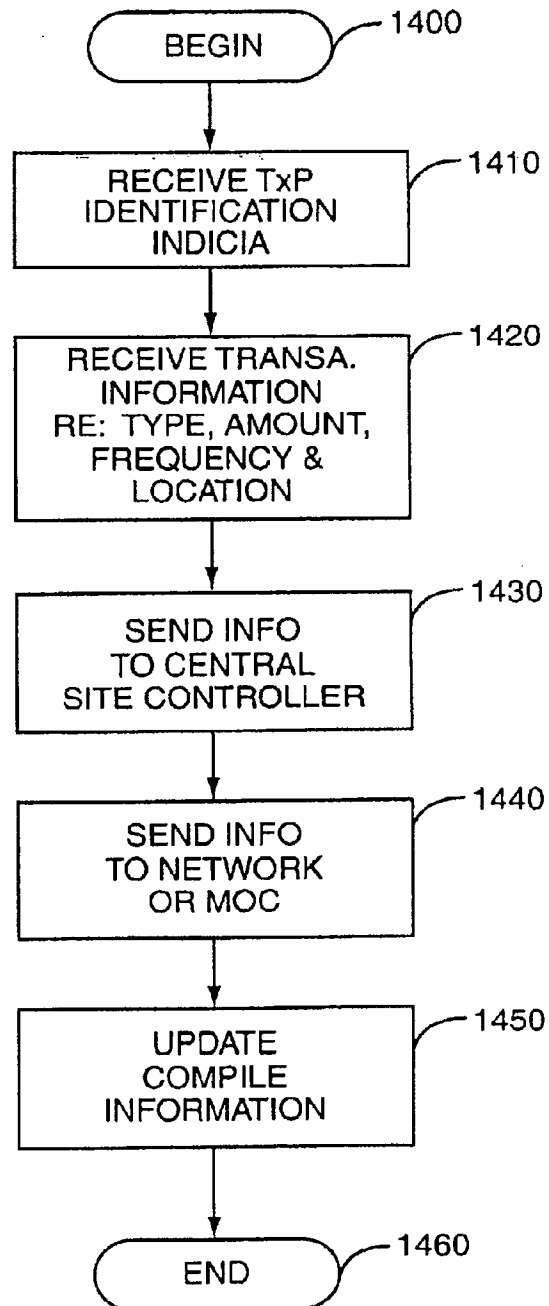
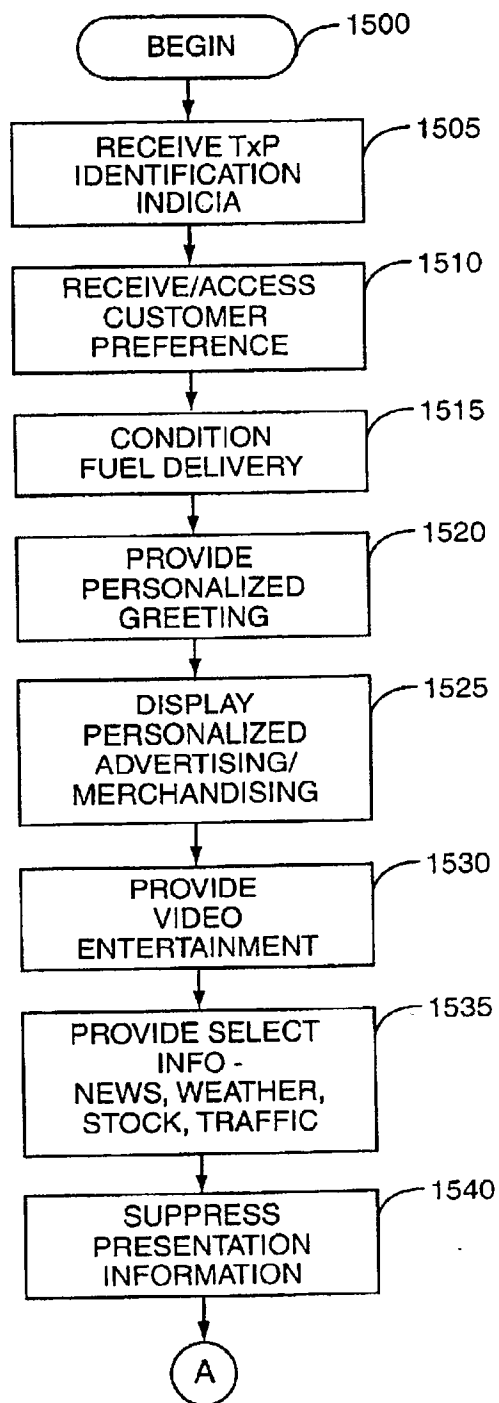
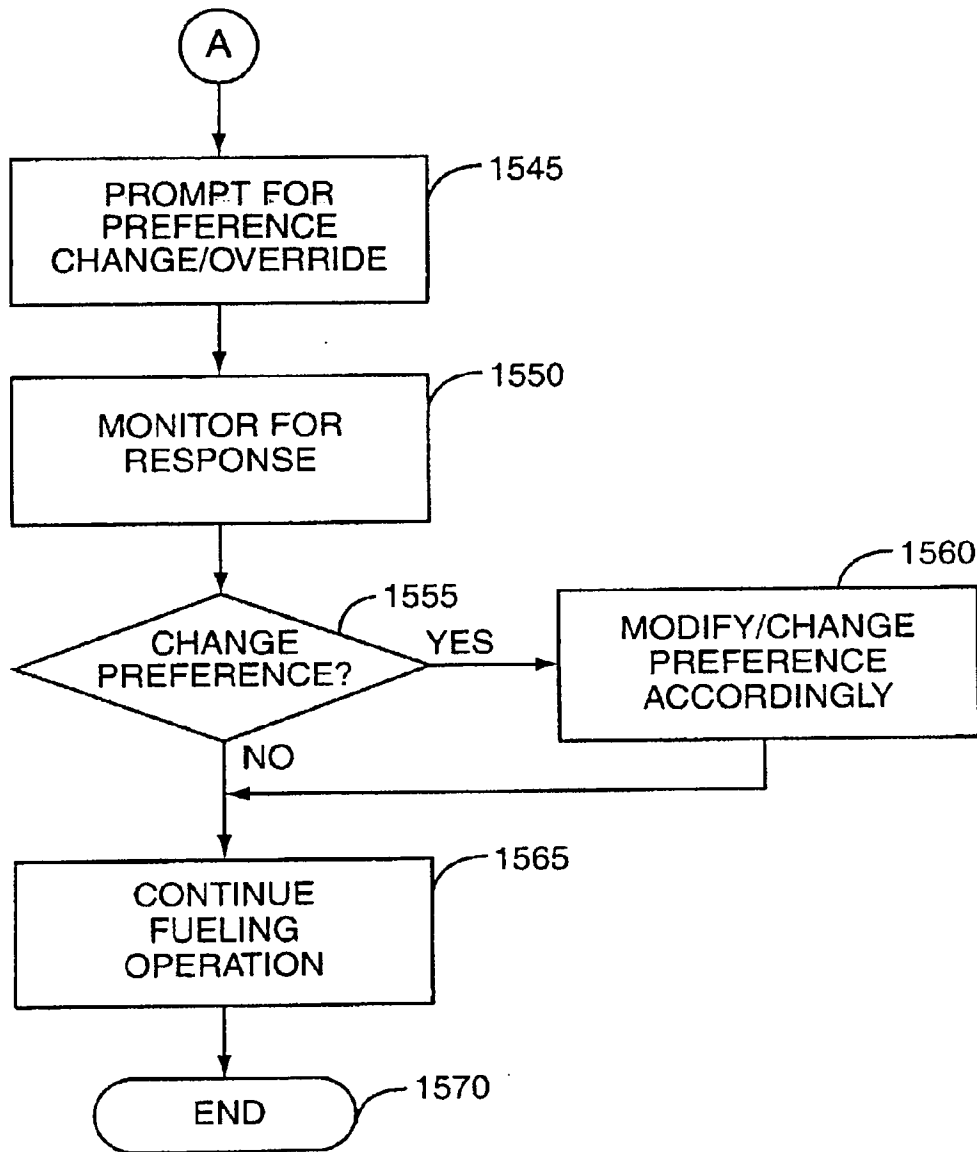


FIG. 23

CREATING A SHADOW LEDGER**FIG. 24**

TRANSACTION TRACKING**FIG. 25**

CUSTOMER PREFERENCES**FIG. 26A**

**FIG. 26B**

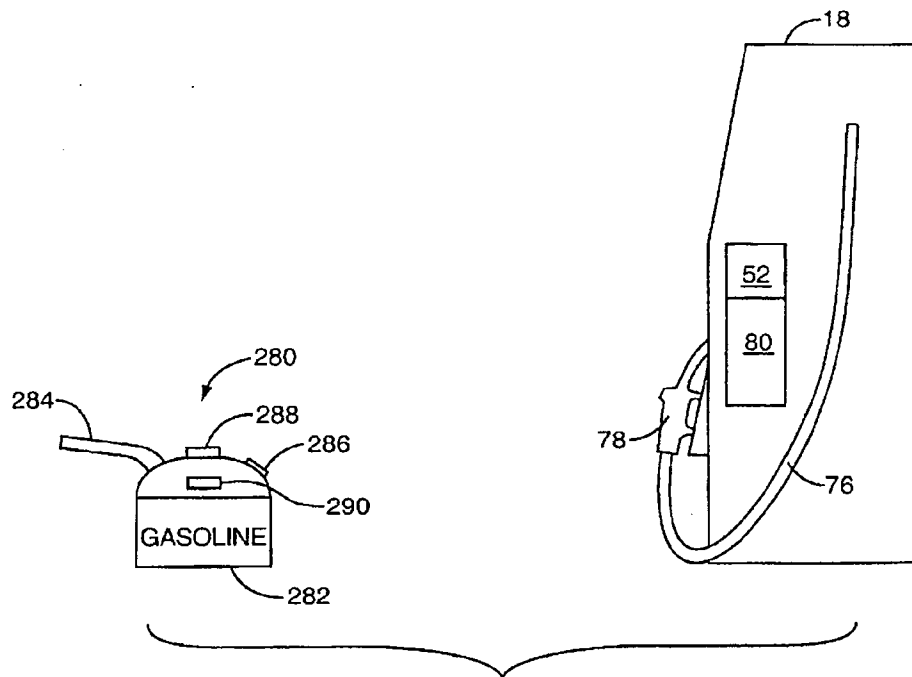


FIG. 27

PREVENTING UNAUTHORIZED CONTAINER FUELING

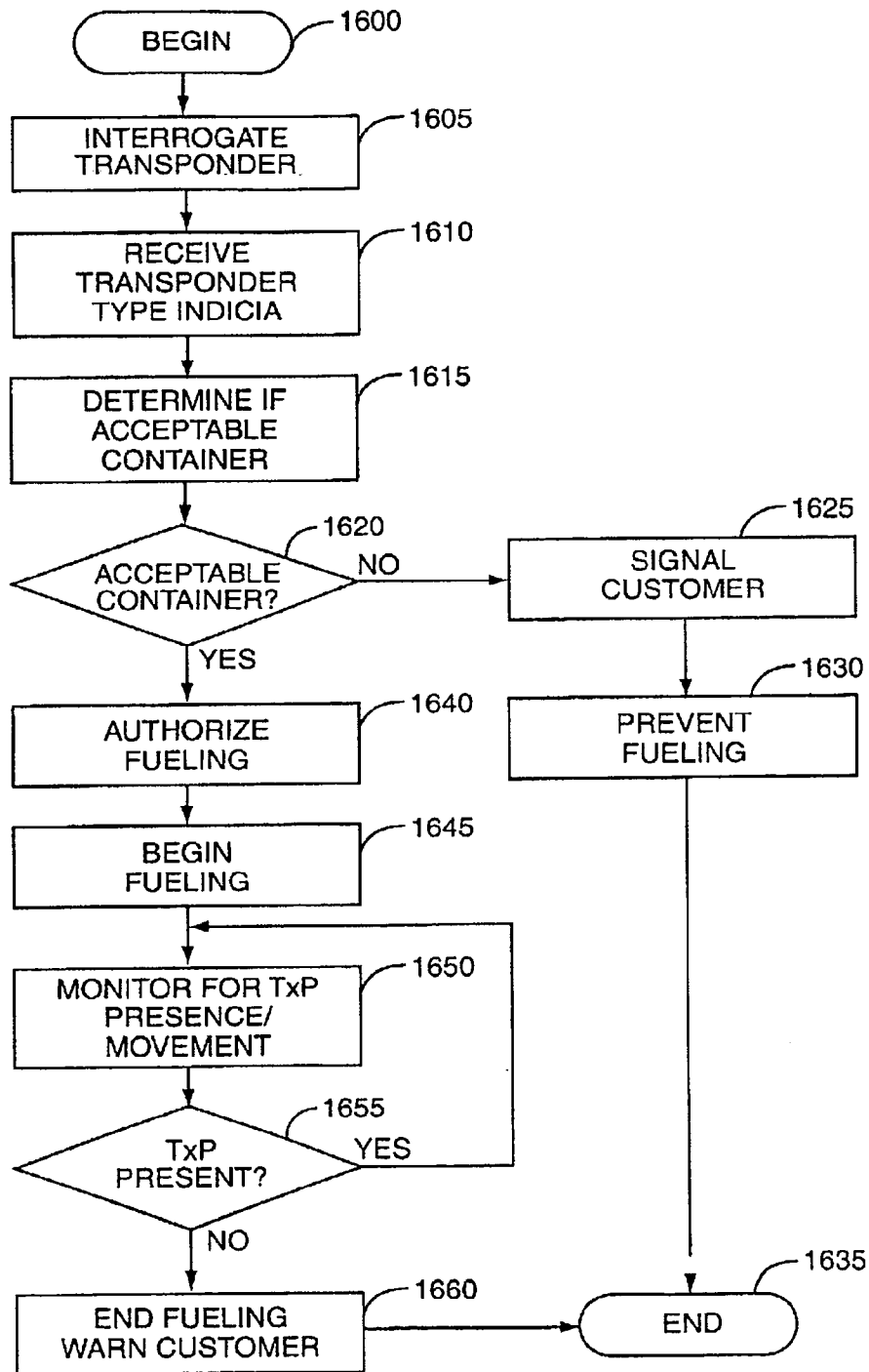


FIG. 28

PRETRANSACTION ESTIMATES

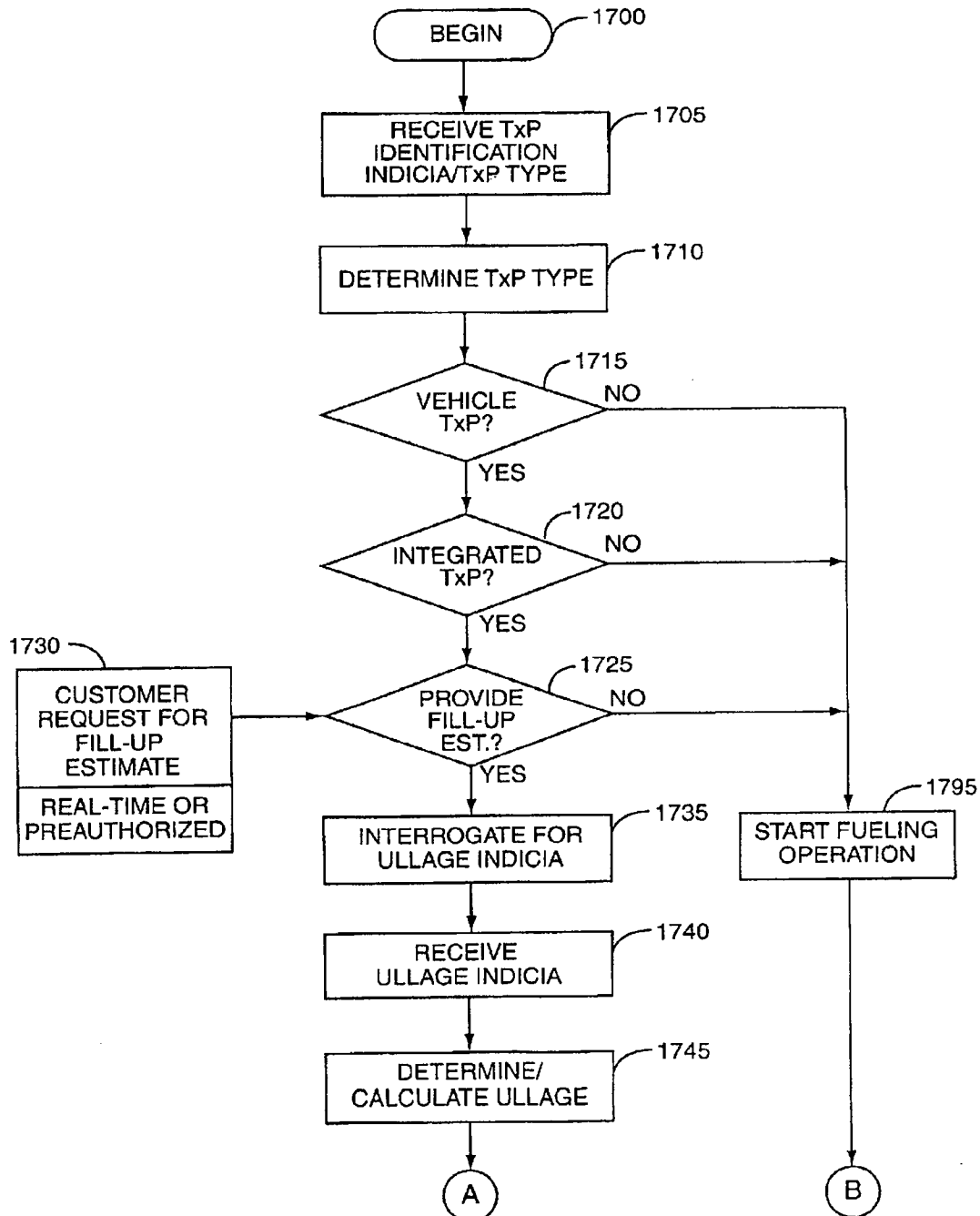


FIG. 29A

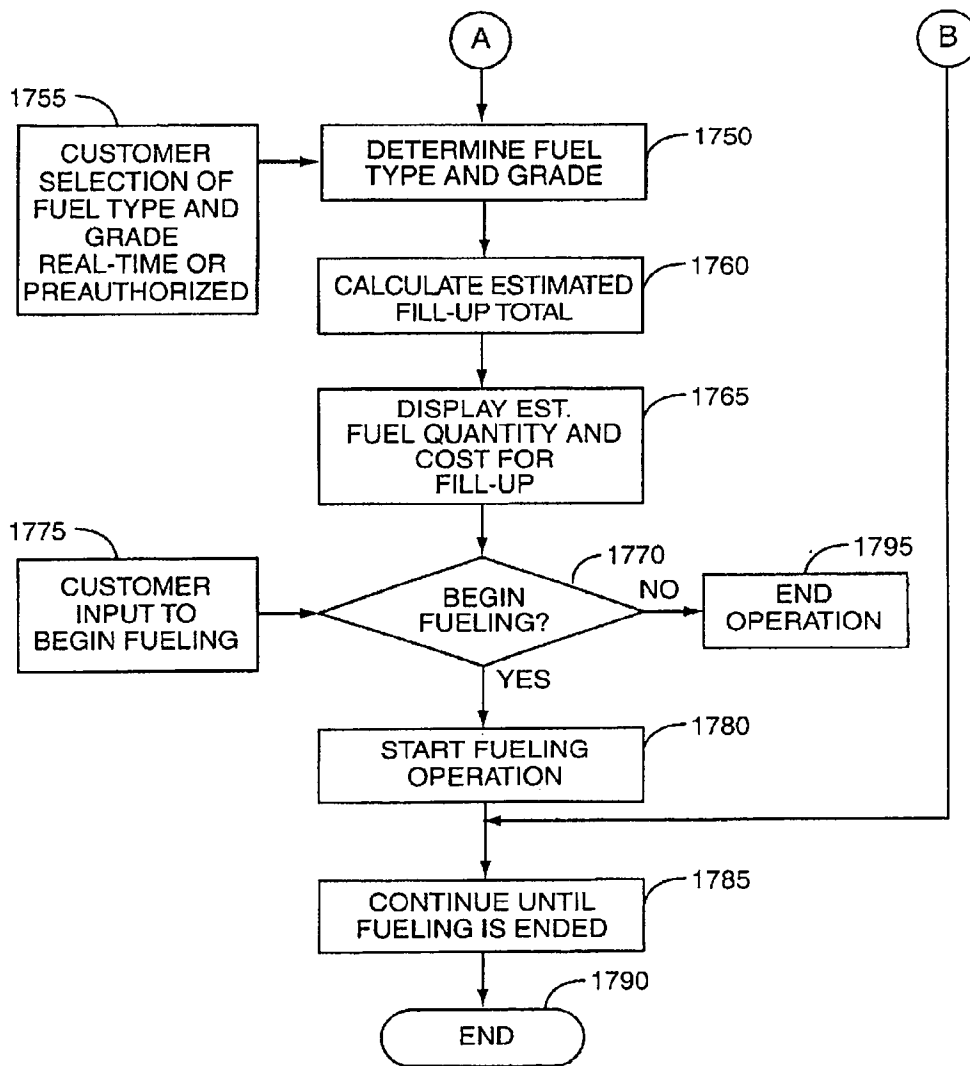


FIG. 29B

ULLAGE BASED CASH ACCEPTOR CONTROL

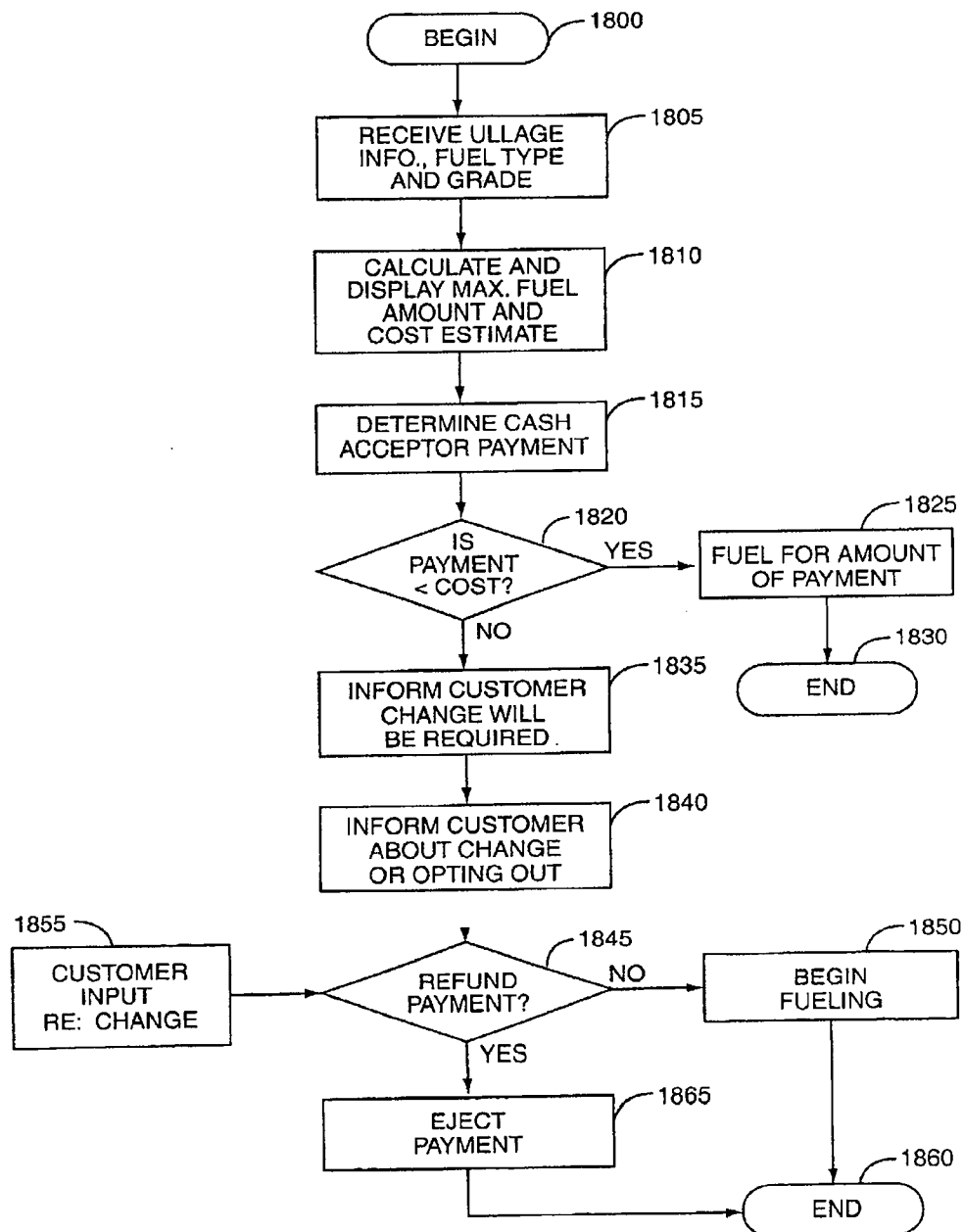


FIG. 30

1

FUEL DISPENSING AND RETAIL SYSTEM FOR PROVIDING CUSTOMER SELECTED GUIDELINES AND LIMITATIONS

This is a divisional of Application Ser. No. 09/152,564, 5
filed Sep. 14, 1998 now abandoned.

BACKGROUND OF THE INVENTION

This application claims the benefit of U.S. Provisional
Application Serial No. 60/060,066, filed Sept. 26, 1997. 10

The present invention relates generally to fuel dispensers
and, more particularly, to fuel dispensers and systems
capable of communicating with various types of transpon-
ders and detecting their movement within and throughout a
fueling environment. 15

In recent years, traditional gasoline pumps and service
stations have evolved into elaborate point-of-sale (POS)
devices having sophisticated control electronics and user
interfaces with large displays and touch-pads or screens. The
dispensers include various types of payment means, such as
card readers and cash acceptors, to expedite and further
enhance fueling transactions. A customer is not limited to the
purchase of fuel at the dispenser. More recent dispensers
allow the customer to purchase services, such as car washes,
and goods, such as fast food or convenience store products
at the dispenser. Once purchased, the customer need only
pick up the goods and services at the station store or the
outlet of a vending machine. 20

Remote transaction systems have evolved wherein the
fuel dispenser is adapted to communicate with various types
of remote communication devices, such as transponders, to
provide various types of identification and information to the
fuel dispenser automatically. Given the sophistication of
these transaction systems and the numerous choices pro-
vided to the customer at the dispenser, conducting transac-
tions with transponders will be useful to allow the dispenser
and fuel station store to monitor the movement of a person
carrying a transponder and a vehicle having a transponder,
enhance transaction and marketing efficiencies, and improve
safety in the fueling environment. 25

SUMMARY OF THE INVENTION

The present invention is a dispensing system, which
cooperates with transponders to provide guidelines and
limitations on transactions associated with the transponder. 30
These may be cash, credit or debit type transactions so long
as the transponder is communicably associated with the
dispensing system somewhere before, during or after fueling
or purchase. These guidelines and limitations on customer
purchases are either stored in a database in association with
a transponder ID and accessible by an associated control
system or transmitted from the transponder to the dispenser
during each transaction. Regardless of the manner of access,
the control system will operate to carry out transactions and
interest with the customer according to pre-defined guide-
lines and limitations. 35

Attempts to circumvent the guidelines or limitations will
preferably result in a message to the customer or operator
that the item or service presented for purchase is not
available to that particular customer when the transaction is
associated with the customer transponder. Uniquely, these
guidelines and limitations may affect both fueling and
non-fueling transactions. The guidelines and limitations may
be used to set a particular dollar amount or limit what the
customer associated with the transponder may spend, as well
as limit the frequency and types of purchases made by the
customer. 40

2

customer. Given the tremendous latitude made available
with using such transponders for transactions, authorization
controls provide safety and security features making the
lives of those controlling the customer associated with the
transponder significantly easier. The invention is also par-
ticularly useful for fleet fueling applications where drivers
are limited to selected purchases and purchase amounts.

Accordingly, one aspect of the invention is to provide a
fuel dispensing system for setting transaction parameters in
association with a remote communications unit. This system
will include wireless or radio communications electronics
adapted to receive signals from remote communications
units, a transaction interface for carrying out transactions,
and a control system and associated memory operating in
conjunction with the communications electronics and a
transaction interface. The control system is adapted to
receive indicia from a remote communications unit and
control the transaction at the transaction interface involving
the remote communications unit according to predefined
parameters associated with the remote communications unit.
Any identification indicia and predefined parameters may be
stored in the memory in association with the remote com-
munications unit and the control system may be adapted to
access these predefined parameters in the memory upon
receipt of the identification indicia and control the transac-
tion accordingly. Alternatively, the predefined parameters
may be transmitted directly from the remote communica-
tions unit to the communications electronics and control
system. The predefined parameters may limit a transaction to
a select type or grade of fuel, a select type or amount of a
product or service, as well as limiting or preventing the
purchase of certain products or services. Notably, the control
system may include a dispenser control system, a central site
control system, a control system associated with a remote
network, or a combination thereof. 45

Preferably, the system includes a means for alerting the
customer that a predefined parameter exists and/or has been
met or exceeded. The means for alerting the customer may
be anything from an audible alert to a visual indication on
the display. 50

Typically, the communications electronics are incorpo-
rated within an interrogator associated with the dispenser
and the remote communications units are classic transpon-
ders adapted to respond to interrogation signals from the
dispenser with the identification indicia and any indicia
relating to the parameters, if necessary.

These and other aspects of the present invention will
become apparent to those skilled in the art after reading the
following description of the preferred embodiments when
considered with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic representation of a fueling and retail
environment constructed according to the present invention.

FIG. 2A depicts a vehicle having a vehicle-mounted
transponder constructed according to the present invention.

FIG. 2B depicts a personal transponder integrated into a
debit/credit or smartcard constructed according to the
present invention.

FIG. 2C depicts a personal transponder integrated into
key fob constructed according to the present invention.

FIG. 3 depicts a fuel dispenser shown constructed accord-
ing to the present invention.

FIG. 4A is a schematic representation of a transponder
having separate communication and cryptography electron-
ics constructed according to the present invention. 55

3

FIG. 4B is a schematic representation of transponder having integrated electronics constructed according to the present invention.

FIG. 5 is a schematic representation of fuel dispenser electronics constructed according to the present invention.

FIG. 6 is a schematic representation of convenience store transaction electronics, including a transaction terminal, for a fueling environment constructed according to the present invention.

FIG. 7 is a schematic representation of a quick-serve restaurant control system for a fueling environment constructed according to the present invention.

FIG. 8 is a schematic representation of a car wash control system constructed according to the present invention.

FIG. 9 is a schematic representation of a central control system for a fueling environment constructed according to the present invention.

FIGS. 10A and 10B are a flow chart representing a basic flow of a multistage ordering process according to the present invention.

FIG. 10C is a flow chart representing a basic flow of a loyalty benefit process according to the present invention.

FIGS. 11A and 11B are a flow chart representing a basic interaction with a transponder during a cash transaction according to the present invention.

FIG. 11C is a flow chart representing a basic process for providing a discount for transponder use during a transaction according to the present invention.

FIGS. 11D and 11E are a flow chart of a basic process for providing prepayment on a transponder for subsequent transactions according to the present invention.

FIG. 12A is a schematic representation of a side view of a dispenser having multiple antenna arrangements for providing directional interrogation fields constructed according to the present invention.

FIG. 12B is a schematic representation of a front view of a dispenser having multiple antenna arrangements for providing directional interrogation fields constructed according to the present invention.

FIGS. 12C and 12D are a flow chart of a basic process for monitoring the location and type of transponder at a fueling position according to a preferred embodiment of the present invention.

FIG. 13A is an overhead schematic representation of a fueling environment having antenna arrangements providing various interrogation fields.

FIG. 13B is an overhead schematic representation of a fueling environment having antenna arrangements providing continuous location monitoring of transponders in the fueling environment.

FIGS. 14A and 14B are a flow chart of a basic process for determining the proximity or location of a transponder with respect to a particular fueling position at a dispenser according to the present invention.

FIG. 15 is a flow chart of a basic control process for determining transponder location for an embodiment similar to that depicted in FIG. 13B.

FIG. 16 is a perspective view of a fuel dispenser having underground antennas constructed according to the present invention.

FIG. 17 is an overhead schematic representation of a fuel dispenser constructed according to the present invention.

FIGS. 18A and 18B are a flow chart of a basic process for preconditioning a dispenser followed by secondary transaction authorization according to the present invention.

4

FIG. 19 depicts a preferred process for providing secure communications between a transponder and a host network through a fuel dispenser.

FIG. 20 is a flow chart of a basic transponder interaction for providing theft deterrence and prevention according to the present invention.

FIG. 21 is a flow chart of a basic transponder interaction for preventing drive-offs according to the present invention.

FIG. 22 is a flow chart of a basic process for providing guidelines or limitations for a fueling or purchase transaction made in association with a transponder according to the present invention.

FIG. 23 is a schematic representation of a transponder and dispenser system for providing a shadow ledger of transponder transactions constructed according to the present invention.

FIG. 24 is a flow chart of a basic process for maintaining a shadow ledger according to the present invention.

FIG. 25 is a flow chart of a basic process for transaction tracking throughout numerous fueling environments according to the present invention.

FIGS. 26A and 26B are a flow chart of a basic process for providing predefined preferences to a customer during a transaction made in association with a transponder according to the present invention.

FIG. 27 is a schematic representation of a fuel dispenser and fuel container for personal transport of fuel.

FIG. 28 is a flow chart of a basic process for monitoring and detecting acceptable containers for fueling.

FIGS. 29A and 29B are a flow chart of a basic process for providing pre-transaction estimates according to the present invention.

FIG. 30 is a flow chart of a basic process for providing a customer with estimated cost totals of a fueling transaction to enable a customer to make an informed decision regarding payment at a cash acceptor of a fuel dispenser.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following description, like reference characters designate like or corresponding parts throughout the several figures. It should be understood that the illustrations are for the purpose of describing preferred embodiments of the invention and are not intended to limit the invention thereto.

Given the extensive nature of the present application, an overview of the necessary hardware for the various areas in the fueling environment will be discussed followed by a description of the various functional aspects of the system and how the customer will react and interact with the system during various types of transactions.

As best seen in FIG. 1, a fueling and retail environment, generally designated 10, is shown constructed according to the present invention. The fueling and retail environment provides customers 12 the opportunity to purchase fuel for their vehicles 14 as well as other goods and services, such as fast food and car washes. The fueling and retail environment 10 may include one or more of a forecourt 16, where the fuel dispensers 18 are located, a convenience or fuel station store 20, one or more quick-serve restaurants (QSR) 22, a car wash 24, and a backroom 26. The backroom 26 is generally the central control area for integrating or coordinating control of the dispensers 18, convenience store 20, QSR 22, and car wash 24.

The convenience store 20 typically includes an inventory of a wide assortment of products, ranging from beverages

5

and foods to household goods. The convenience store includes a transaction terminal or register 30, where a customer 12 may purchase convenience store products, fuel, car washes or QSR food.

The QSR 22 generally includes an order pick-up area 32 having a QSR transaction terminal or register 34 located within the convenience store and a drive-thru terminal and window 36. Depending on the application, the QSR transaction terminal 34 and drive-thru terminal 36 may be separated or integrated in any fashion. Usually, customers are able to place orders at the QSR transaction terminal 34 in the store as well as pick up orders in conventional drive-thru style at drive-thru terminal 36.

The QSR 22 may also include a food preparation area 40, a food preparation interface 42 for providing order instruction to QSR food preparers, a drive-thru order placement interface 44 for placing drive-thru orders in a conventional manner, and a customer position monitor 46 for determining the location or position of a customer in line to pick up a QSR order at the drive-thru window 36. Notably, the drive-thru and car wash lanes depicted in FIG. 1 are designed to control the flow of traffic through the respective lanes and aid to ensure vehicles, and their respective transponders, pass by the various interrogation points in the fueling environment as desired.

The car wash 24 includes a car wash interface 48 that interacts with the customer and controls the automatic car wash system (not shown), which may be any suitable automatic car wash. Preferably, a customer 12 will be able to order a car wash at a fuel dispenser 18, at the transaction terminal or register 30 of the convenience store 20, at the QSR transaction terminal 34, or at the car wash interface 48 directly. Similarly, customers are able to order fast-food items from the QSR 22 from various locations in the fueling environment 10, including at the fuel dispensers 18, drive-thru order placement interface 44, and the in-store QSR terminal 34.

Although various overall system and control integration schemes are available, the four major parts of the fueling environment 10—forecourt 16, convenience store 20, QSR 22 and car wash 24—typically interface at the backroom 26 using a central control system 50. The central control system 50 may include any number of individual controllers from the various parts of the fueling environment 10 to provide overall system control and integration. The central control system 50 may interface with the fuel dispensers 18, transaction terminal 30, QSR transaction terminal 34 and the car wash interface 48. Preferably the drive-thru terminal 36, drive-thru order placement interface 44 and customer position monitor 46 directly interface with the drive-thru terminal 36 in order to integrate the QSR functions prior to interfacing with the central control system 50. However, those of ordinary skill in the art will recognize several control variations capable of implementing an integrated system. Additionally, an automated vending system 28 may also interface with the central control system 50 or directly with any one of the other areas of the fueling environment 10, such as the fuel dispensers 18, in order to allow a customer 12 to purchase products from the vending system 28 at a remote location.

The present invention relates generally to providing remote communications between the customer 12 or the vehicle 14 and various parts of the fueling environment briefly described above. In short, many areas within the fueling environment 10 will be equipped with communication electronics capable of providing uni- or bi-directional

6

communications with the customer or vehicle carrying a remote communications device. The communication electronics will typically include a transmitter for transmitting signals to the remote communications device and a receiver for receiving signals emanating from the remote communications device. The remote communications device may also include a receiver and transmitter. The transmitter and receiver of the remote communications device may separately receive and separately transmit signals in cooperation with an associated control system or may be configured so that the transmitter actually operates on and modifies a signal received from the communication electronics in the fueling environment 10. The latter embodiment encompasses traditional transponder-type communication systems wherein the remote communications device may be either passive or active.

For the sake of conciseness and readability, the term “transponder” will be used herein to describe any type of remote communications device capable of communicating with the communication electronics of the fueling environment 10. The remote communications device may include traditional receivers and transmitters alone or in combination as well as traditional transponder electronics adapted to modify an original signal to provide a transmit signal. A transponder as defined herein may provide either unidirectional or bidirectional communications with the communications electronics of the fueling environment 10.

Likewise, the communication electronics associated with the various aspects of the fueling environment 10 will be called an “interrogator.” An interrogator will generally include a transmitter and receiver capable of communicating with a transponder as defined above. Please note that an interrogator, as defined herein, need not contain both a receiver and a transmitter for various aspects of the invention.

With the above in mind, the fueling environment 10 may include many interrogators of varying capability. These interrogators may include: dispenser interrogators 52, a store transaction interrogator 54, a QSR transaction interrogator 56, a drive-thru pick-up interrogator 58, a drive-thru order interrogator 60, and a drive-thru position interrogator 62. As shown in FIGS. 2A, 2B and 2C, the dispenser interrogator 52 is generally adapted to communicate with vehicle-mounted transponders 64 and personal transponder 66. The personal transponder 66 may be mounted on a key fob 68, a wallet card 70, or any other device typically carried by the customer 12, as shown in FIGS. 2B and 2C. FIG. 2A depicts a vehicle 14 having a vehicle-mounted transponder 64.

The levels of sophistication of the vehicle-mounted transponder 64 may vary drastically. The transponder 64 may be integrated with the vehicle's main computer and control system, or may simply be a sticker placed on a window or on another part of the vehicle. The transponder 64 may be active or passive, and may be adapted to either simply send out an identification number or carry out high-level communications and have the ability to process, store and retrieve information. Various features of the invention will be disclosed in greater detail.

As best seen in FIG. 3, a fuel dispenser 18 is shown constructed according to and as part of the present invention. The dispenser provides a fuel delivery path from an underground storage tank (not shown) to a vehicle 14, (shown in FIGS. 1 and 2A). The delivery path includes a fuel delivery line 72 having a fuel metering device 74. The fuel delivery line 72 communicates with a fuel delivery hose 76 outside of the dispenser 18 and a delivery nozzle 78. The nozzle 78 provides manual control of fuel delivery to the vehicle 14.

The dispenser 18 also includes a dispenser control system 80 having one or more controllers and associated memory 82. The dispenser control system 80 may receive volume data from the metering device 74 through cabling 84 as well as provide control of fuel delivery. The dispenser control system 80 may provide audible signals to an audio module and speaker 86 in order to provide various beeps, tones and audible messages to a customer. These messages may include warnings, instructions and advertising.

The dispenser 18 is preferably equipped with a payment acceptor, such as a card reader 88 or cash acceptor 90, along with a receipt printer 92. With these options, the dispenser control system 80 may read data from the magnetic strip of a card inserted in the card reader 88 or receive cash from a customer and communicate such information to the central control system 50 (as shown in FIG. 1), such as the G-site controller sold by Gilbarco Inc., 7300 West Friendly Avenue, Greensboro, N.C. The central control system 50 typically communicates with a remote network 94, such as a card verification authority, to ascertain whether a transaction proposed to be charged to or debited from an account associated with the card inserted in the card reader 88 is authorized.

The dispenser 18 will include one or more types of displays, preferably one or more alpha-numeric displays 96 together with a high-resolution graphics display 100. The graphics display 100 will generally have an associated key pad 102 adjacent to the display or integrated with the display to provide a touch interface. The dispenser may include an additional, auxiliary key pad 104 associated with the card reader 88 for entering secret codes or personal identification numbers (PIN's). Notably, the displays 96, 100 and key pads 102, 104 may be integrated into a single device and/or touch interface. The dispenser control system 80 is preferably comparable to the microprocessor-based control systems used in CRIND (card reader in dispenser) and TRIND (tag or transponder reader in dispenser) type units sold by Gilbarco Inc. under the trademark THE ADVANTAGE.

As noted, the dispenser control system 80 may include or be associated with dispenser communication electronics referred to as interrogator 52 for providing remote unidirectional or bidirectional communications between a transponder and the dispenser. These transponders may incorporate the Micron Microstamp™ produced by Micron Communications, Inc., 8000 South Federal Way, Boise, Id. 83707-0006. The Micron Microstamp™ engine is an integrated system implementing a communications platform referred to as the Microstamp™ standard on a single CMOS chip. A detailed description of the Microstamp™ engine and the method of communication is provided in its data sheets in the Micron Microstamp™ Standard Programmers Reference Manual provided by Micron Communications, Inc. These references and the information provided by Micron Communications on their web site at <http://www.mncc.micron.com> are incorporated herein by reference. Although the preferred communications method includes radio frequencies in the microwave range, these communications may include infrared, acoustic or other known remote communication methods acceptable for use in a fueling environment. Additionally, the dispenser 18 may include one or more antennas 108 associated with the dispenser interrogator 52.

Turning now to FIG. 4A, the preferred embodiment of a transponder is shown. Transponder communication electronics 110, adapted to provide remote communications with the various interrogators, include a transmitter 114 and receiver 116 having associated antennas 118, 120. The

transmitter 114 and receiver 116 operate to transmit and receive data to and from an interrogator. The communication electronics 110 may include a battery power supply 122, a communication controller 124 associated with a memory 126, having software 128 necessary to operate the communication electronics 110 and optional cryptography electronics 112.

Serial communications between the communication electronics 110 and cryptography electronics 112 is provided via the input/output (I/O) ports 130, 140 associated with the respective electronics. The communication electronics 110 provide a signal from a clock 132 to the I/O port 140 of the cryptography electronics 112. The cryptography electronics 112 include a controller 134, memory 136 and software 138 necessary to encrypt and decrypt data, as well as provide any additional operations. The memory 126, 136 may include random access memory (RAM), read only memory (ROM), or a combination thereof. Notably, the communication controller 124 and the cryptography controller 134 may be integrated into one controller. Similarly, the software and memory of the communication and cryptography modules may be integrated or embodied in hardware.

As shown in FIG. 4B, the communication and cryptography electronics, as well as any associated controllers, may be integrated into a single controller system and/or integrated circuit. In such cases, a single controller 142 is associated with memory 144 having software 146 as necessary for operation. In such an integrated system, the controller 142 will carry out any cryptography functions as well as any other functions necessary for operation.

In the preferred embodiment, the communications controller 124, 142 specifically provides a spread-spectrum processor associated with an 8-bit microcontroller. The memory 126, 144 includes 256 bytes of RAM. The receiver 116 operates in conjunction with the spread-spectrum processor and is capable of receiving direct sequence, spread-spectrum signals having a center frequency of 2.44175 GHz. The transmitter 114 is preferably a DPSK modulated backscatter transmitter transmitting differential phase shift key (DPSK) modulated back scatter at 2.44175 GHz with a 596 KHz sub-carrier. The various interrogators in the fueling environment 10 are adapted to receive and transmit the signals to properly communicate with the transponders. For additional information on a transponder/interrogator system providing for highly secure transactions between a transponder and a host authorization system through a dispenser, attention is drawn to application Ser. No. 08/895,417 filed Jul. 16, 1997, entitled CRYPTOGRAPHY SECURITY FOR REMOTE DISPENSER TRANSACTIONS in the name of William S. Johnson, Jr.; application Ser. No. 08/895,282 filed Jul. 16, 1997, entitled MEMORY AND PASSWORD ORGANIZATION FOR REMOTE DISPENSER TRANSACTIONS in the name of William S. Johnson, Jr.; and application Ser. No. 08/895,225 filed Jul. 16, 1997, entitled PROTOCOL FOR REMOTE DISPENSER TRANSACTIONS in the name of William S. Johnson, Jr. The disclosures of these applications are incorporated herein by reference.

FIG. 5 shows a basic schematic overview of the dispenser electronics wherein a dispenser control system 80 includes a controller associated with the memory 82 to interface with the central control system 50 through an interface 146. The dispenser control system 80 provides a graphical user interface with key pad 102 and display 100. Audio/video electronics 86 is adapted to interface with the dispenser control system 80 and/or an auxiliary audio/video source 156 to provide advertising, merchandising and multimedia presen-

tations to a customer in addition to basic transaction functions. The graphical user interface provided by the dispenser allows customers to purchase goods and services other than fuel at the dispenser. The customer may purchase a car wash and/or order food from the QSR while fueling the vehicle. Preferably, the customer is provided a video menu at the display 100 to facilitate selection of the various services, goods and food available for purchase. The card reader 88 and cash acceptor 90 allow the customer to pay for any of the services, goods or food ordered at the dispenser while the printer 92 will provide a written record of the transaction. The dispenser control system 80 is operatively associated with a dispenser interrogator 52, which has a receiver 142 and a transmitter 144. The receiver and transmitter typically associate with one or more antennas 108 to provide remote communications with a transponder. The dispenser control system 80 communicates with the central control system 50 in the backroom 26.

In like fashion, the convenience store transaction electronics shown in FIG. 6, and more specifically the transaction terminal register 30, include a store transaction controller 152, associated memory 154, the interrogator 54, and a display and key pad 150, 160 forming a transaction terminal interface. The transaction controller 152 interacts with the central control system 50 through the central site control interface 160. The interrogator 54 includes a receiver 162 and a transmitter 164, both of which are associated with one or more antennas 166. The transaction terminal 30 is adapted to provide typical transaction functions of a cash register and a card authorization terminal in addition to communicating with transponders within the store and/or proximate to the terminal. The communications between the transponder and the store transaction terminal are generally related to transactional and customer identification and monitoring, although other features will become apparent to those skilled in the art upon reading this disclosure.

Attention is now drawn to FIG. 7 and the schematic outline of the QSR electronics shown therein. The QSR will generally have a controller 168 and associated memory 170 capable of interfacing with the central control system 50 through a central site control interface 172. As with many QSR's, a transaction terminal or register 174 is provided having a key pad 176 and display 178. The QSR transaction terminal 174 is used by a QSR operator to take customer orders from within the store in conventional fashion. The orders are either verbally or electronically communicated to the food preparation area 40 through the QSR controller 168. The QSR transaction terminal 174 is associated with interrogator 56 having a receiver 177 and a transmitter 179 associated with one or more antennas 175. The food preparation area will typically have a food preparation interface 42 having a display 180 and a key pad 182. The food preparation interface 42 may be a terminal run from the QSR controller 168 or may contain a food preparation controller 184 within the food preparation interface 42. However the system is arranged, order information is passed from one of the order interfaces to the food preparation display 180 to alert food preparers of an order.

In a QSR embodiment providing drive-thru capability, a remote order entry interface 186 is provided. The order entry interface 186 may include a simple menu board and audio intercom system 188, or in a more sophisticated embodiment, may provide for bi-directional video intercom using the audio intercom 188 and a video system 190 allowing the customer and QSR operator to audibly and visually interact with one another during order placement.

The order entry interface 186 may also include an interrogator 60 having a receiver 192 and a transmitter 194, associated with one or more antennas 195, for communicating with a transponder of a customer when the customer is placing an order at the order entry interface 186.

Typically, orders placed at the order entry interface 186 are sent to the order pickup interface 196, which is normally situated proximate to the pick-up window 36 at the end of the drive-thru lane. The order pick-up interface 196 will have an audio system 198 to provide the audio intercom and an optional video system 200 if video intercom with the order entry interface 186 is desired. The order pick-up interface 196 also has an associated interrogator 58 having a receiver 202 and a transmitter 204 associated with one or more antennas 206.

Unlike existing QSR's, the present invention may include a customer position detector 208, preferably placed somewhere along the drive-thru lane to detect when a customer is at or is past that position en route to pick up an order, which may have been placed at a fuel dispenser 18. The customer position detector 208 is associated with the drive-thru position interrogator 62 and includes a receiver 210 and a transmitter 212 associated with one or more antennas 214.

FIG. 8 depicts the basic outline of the car wash electronics, which includes a controller 216, memory 218, a key pad 220, a display 222 and the interrogator 51. The key pad 220 and display 222 combine with the controller 216 to provide a customer interface 48. The interrogator 51 includes a receiver 224 and a transmitter 226 associated with one or more antennas 228. Additionally, the car wash controller 216 preferably communicates with the central control system 50 in the store via a central site control interface 230. The interrogator 51 will typically communicate with a customer transponder to automatically authorize a car wash previously paid for at the dispenser or inside the store. The key pad may be used to insert a secret code or other information to select a type of wash or otherwise authorize the car wash.

FIG. 9 generally depicts the central control system 50 found in the backroom 26 of the fueling environment 10. The central control system 50 may include one or more controllers 232 associated with memory 234. The central control system 50 may include multiple interfaces with the various areas in the fueling environment 10. These interfaces include the car wash interface 230, dispenser interface 146, QSR interface 172 and the vending interface 236 connected to an automated vending machine 28. Additionally, the central controller 232 may have a dedicated network or authorization interface 238 connected to a host transaction network 94 for authorizing credit and debit transactions and the like. An Internet interface may also be provided for transactions and other information relating to operation, advertising, merchandising and general inventory and management functions.

The dedicated authorization interface and/or Internet interface may operate on a dedicated service line or a telephone system 242. Furthermore, the central control system 50 may have a direct operator interface 244 associated with the controller 232 to allow an operator to interact with the control system. In more advanced embodiments, a central positioning interface 246 associated with multiple antennas 248 may be used to determine transponder position and location throughout the fueling environment. Those skilled in the art will be aware of a multitude of positioning and locating techniques, such as triangulation, wherein various characteristics of a signal emitted from the transpon-

der are measured and monitored to determine movement as well as precise location. The antennas 248 associated with the central positioning interface 246 may take the place of or act in conjunction with the various antennas throughout the fueling environment to locate and monitor movement of the transponders in the fueling environment. Attention is drawn to application Ser. No. 08/966,237 entitled TRANSPONDER DISTINCTION IN A FUELING ENVIRONMENT-filed Nov. 7, 1997, in the name of William S. Johnson, Jr. and application Ser. No. 08/759,733 filed Dec. 6, 1996, entitled INTELLIGENT FUELING in the name of Hartsell, et al. The entire disclosure of these two patent applications is incorporated herein by reference.

Multistage Ordering

One of the many unique aspects of the present invention is providing for monitoring customer position throughout the fueling environment in order to associate orders placed at the fuel dispenser with the particular customer that placed the order at the appropriate receiving point, such as the QSR drive-thru terminal and window 36, QSR transaction terminal 34 in the store, or, in the case of a car wash, at the car wash interface 48. In addition to associating the customer picking up the order with the appropriate order, the QSR can monitor or detect the position of the customer in the drive-thru line or elsewhere in the fueling environment to determine when to start order preparation.

For example, during the fueling operation, the customer may decide to order a few items from the QSR menu displayed at the dispenser 18. As the customer enters the order, the order is associated with the transponder carried by the customer or mounted on the customer's vehicle. The customer may choose to pay for the order along with the fuel at the dispenser, at the order pick-up place at the drive-thru window, or at one of the in-store registers associated with the QSR or the convenience store. Continuing with our example and assuming the transaction was paid for at the dispenser along with the fuel, the customer will enter his vehicle and proceed to drive around the fuel station store along the drive-thru lane and pass the customer position monitor 46. As the customer approaches the customer position monitor 46, the drive-thru position interrogator 62 will receive a signal from the customer transponder indicating the customer is at a known position in the drive-thru lane. At this point, the QSR control system 168 will alert the food preparation area 40 to prepare the order and indicate to the order pick-up interface and controller 196 the position of the customer in the drive-thru lane. Once the customer reaches the order pick-up window, the order pick-up interrogator will determine the presence of the customer transponder and associate the customer's order accordingly so that the drive-thru window operator can deliver the freshly prepared order to the correct customer. Associating the customer with the appropriate order in a fueling environment having a QSR is quite different from traditional QSR drive-thru systems. With QSR's in a fueling environment, orders for pick up at the drive-thru window, or within the store for that matter, may be placed in a different sequence than the sequence in which the orders are actually picked up. The reason for the possible discrepancy between order placement and order pick up arises because orders can be placed at several locations, including the fuel dispenser and the traditional order entry interface 44. In particular, those customers placing orders at the dispenser will most likely intermingle in the drive-thru line with those placing orders at the order entry interface 44. The present invention uses transponders to appropriately associate orders placed at different locations with the appropriate customer at a common pick-up location.

With this in mind, attention is drawn to the flow chart of FIGS. 10A and 10B representing the basic flow of various multistage ordering processes. The process begins (block 500) when the dispenser interrogator 52 receives a signal from a transponder 12, 14 and the dispenser control system 80 forwards transponder identification indicia (ID) to the central control system 50 for authorization (block 502). Authorization may occur locally at the central site controller 232 or at a remote host authorization network. The information to be authorized is generally financial or account information and can either be transmitted with the transponder ID or stored at the central control system 50 or the host network 94 in association with the transponder ID. In the latter case, either the host network 94 or the central control system 50 will associate the ID with the stored account information and then authorize the transponder based on the correlated account information. Preferably, the transponder is read and authorized as the customer and/or vehicle approaches or initially stop's at the fueling position and preferably, at least, before a transaction is initiated to increase transaction efficiency. As the customer fuels the vehicle, the dispenser may display various types of information including advertising and instructional information. Preferably, the dispenser 18 will display options for ordering food items from the QSR or ordering a car wash at the car wash 24 (block 504). The dispenser 18 will determine whether an order is placed (block 506). The dispenser 18 will receive any orders placed by the customer (block 508) and associate the order with the transponder in some fashion (block 510). Typically, the order is associated with a transponder by (1) associating the order with the transponder ID at one of the control systems, (2) transmitting and storing a code associated with the order on the transponder, or (3) actually storing the order on the transponder. Those of ordinary skill in the art will recognize that there are many variations available for associating an order with a transponder. These variations are considered within the scope of this disclosure and the claims that follow.

Although there are various options, two general methods for associating an order with a transponder will be discussed below. With the first, no information is transmitted to the transponder relating to the order. Instead, the electronics at the dispenser 18, central control system 50 or the QSR 22 stores the order information and associates the order with the transponder ID. When one of the interrogators subsequently reads the transponder ID, the pertinent system will correlate the order with the transponder ID. The second method involves writing information to the transponder at the dispenser 18 and subsequently transmitting that information to one of the system interrogators for authorization or order identification. The information written to the transponder may range from a code for identification authorization purposes to the complete order placed at the dispenser.

Returning to FIG. 10A, the basic flow of both of the above-discussed methods are shown. In cases where one of the control systems associates an order based on the transponder ID, the customer order is transferred to the QSR controller 108 through the central control system 50 (block 512). The dispenser 18 will effect payment for the transaction (typically adding the QSR purchase total to the fueling charge) and the QSR controller 168 will alert the food preparation area to prepare the order (block 514).

In a basic environment, the QSR order pick-up interface 198 will monitor for the presence of a transponder through the drive-thru pick-up interrogator 58 or the in-store QSR transaction terminal interrogator 56 (block 516). If a transponder is not detected, the systems continue to monitor for

13

a transponder (block 518). Once a transponder is detected, the transponder ID is received (block 520) and the transponder ID is associated with the appropriate order (block 522). At this point, the QSR operator located at the pick-up window or the in-store transaction terminal is informed of the order corresponding to the customer at the window or terminal (block 524) and the fueling and retail transaction for that particular customer ends (block 526).

Alternatively, once a customer places an order and the dispenser 18 receives the order (block 508), and the order is associated with the transponder (block 510), the dispenser 18 may transmit order indicia, such as a code for the order itself, to the transponder for storage (block 528). Next, the dispenser 18 will effect payment for the transaction as discussed above (block 530). In the more basic embodiment discussed above, the QSR interrogators associated with the QSR window or in-store terminal will monitor for the presence of a transponder (block 516 and 518), receive the transponder order indicia (block 518), and associate the order with the indicia received from the transponder (block 522). The operator is then informed of the order for that particular customer (block 524).

In any of the above embodiments, the customer position detector 46 may be used to alert QSR operators of the approach and location in the drive-thru line of a particular customer. For the sake of clarity, the process of FIG. 10A only depicts using the customer position detector 46 in a process where order indicia is transmitted to the transponder. Please note that using the customer position detector 46 may be used in any of the embodiments, as those of ordinary skill in the art will appreciate.

Once the order is placed, received and associated with the transponder in normal fashion (blocks 500-510), indicia of the order is transmitted to the transponder (block 528) and the transaction is effected (block 530) in normal fashion. At this point, the customer position detector 46 will monitor for the presence of a transponder via the interrogator 62 (blocks 532 and 534). Once a transponder is detected, the customer position detector 46 will forward the transponder indicia to the food preparation area 40 through the QSR controller 108. This allows for the food preparation operators to timely prepare a customer order based on the customer's approach to the pick-up window (block 536). This information may also be sent to the pick-up operator to indicate customer position. The customer will proceed along the drive-thru lane until the pick-up window is approached where the transponder is detected by the order pick-up interrogator 58 (blocks 516 and 518). The transponder ID or indicia is received by the QSR electronics, and the operator is informed of the order corresponding to the customer at the window (blocks 522-526).

Although there are numerous variations to multistage ordering, the important aspects of the invention are associating a transponder with an order placed by a customer at the fuel dispenser and subsequently using information from the transponder to reassociate the order with that particular transponder. Optionally, an additional interrogation stage may provide a further alert to a QSR operator of the approach of a customer to initiate food preparation or simply indicate the position of the customer in line.

The multistage ordering works equally well with QSR's and car wash systems. When a car wash is ordered at the dispenser, the particular car wash ordered is associated with the transponder at the dispenser and subsequently reassociated when the customer approaches the car wash area 24 and is interrogated by the car wash interrogator 51. In the preferred embodiment, the dispenser operates in conjunction

14

with the central control system 50 to provide authorization of the car wash purchased at the dispenser. When the customer is at the car wash 24, the customer's transponder is interrogated for an ID or a code, which the car wash controller and/or the central control system 50 recognizes as preauthorized. If additional security is necessary on any of these embodiments, the customer may receive a code or other indicia, which they are required to enter or submit when the corresponding goods or services are received.

Furthermore, the fuel dispenser 18 is not the only point of sale where ordering may take place. A customer having a transponder may, for instance, order a car wash in conjunction with placing an order at the in-store QSR terminal or the convenience store terminal while purchasing food or other merchandise. The interrogators at either of these terminals can just as easily associate the car wash with the customer transponder and operate through the central control system 50 to subsequently reassociate the customer and the car wash ordered at the car wash interface 48. The multistage ordering disclosed herein provides a solution for keeping track of various transactions in a fueling environment where customer orders are picked up in locations separate from where they are placed and very likely may not be picked up in the order they were placed.

Loyalty Benefits

The present invention may also be configured to provide various types of loyalty benefits based on past and/or current transactions. Loyalty benefits will be provided to a customer in order to encourage subsequent return to a particular fueling environment or one of an associated group of environments. The benefit may also encourage the purchase of additional products during the current or a subsequent transaction. A loyalty point may be earned by a customer for each transaction, transaction amount, or type or quantity of a particular product or service. For example, a loyalty point may be earned for each gallon of gas purchased or for a fill-up requiring eight or more gallons of gas. The store operators have tremendous flexibility in determining the various criteria for earning loyalty points. Additionally, the loyalty benefits or points are preferably redeemed by a customer in part, or in whole, on subsequent visits to the same or an associated fueling environment. Redeeming points at a subsequent transaction provides an incentive for a customer to return to environments participating in the benefit program. Although redeeming points on a subsequent purchase is preferred, benefits may be made immediately available based solely on the current transaction. Furthermore, the benefits may be based upon current and prior transactions, and allow for both current and subsequent benefit. The basic flow of the process for providing such benefits is shown in FIG. 10C.

The process begins (block 540) when a transponder is interrogated (block 542). Preferably, indicia, including identification indicia, is received from the transponder (block 544). Once the relevant controller receives the transponder indicia, one of two events typically occurs. The first option is to receive loyalty information, which is included in the transponder indicia, directly from the transponder. Optionally, the controller may use the transponder indicia, preferably identification indicia, to look up benefit information, including loyalty points, stored in an associated database anywhere within the fueling environment or at a remote network (block 546). Thus, loyalty information may be stored on the transponder and transmitted to the relevant control system or accessed from virtually any location based on some type of identification provided by the transponder.

At this point, the customer is engaging in a transaction and the relevant control systems will monitor such transac-

15

tion (block 548) and determine whether to provide a benefit based on the current transaction (block 550). If a benefit is to be provided based on the current transaction, the controller will determine how to apply the current benefit information (block 552). The controller basically has two options. 5 The controller may store the benefit information on the transponder or the relevant database (block 554), or apply the current benefit information to the current transaction (block 556).

Regardless of whether a benefit is provided based on the current transaction, the controller will preferably determine whether or not to apply a stored benefit to the current transaction based on prior transactions (block 558). If a stored benefit is not available or the controller is not adapted to provide such benefit, the process ends (block 560). If a stored benefit is available for application to the current transaction, the transaction is updated and the appropriate database in the transponder or associated with the controller is updated (block 562). Typically, the benefit is applied to the current transaction at this time, and the process is ended (block 560). 20

The loyalty benefits capable of being provided by this process allow tremendous flexibility and automatically implement incentives to increase customer loyalty and improve business.

Cash Customers

Another important aspect of the present invention is providing refunds and loyalty points or benefits to cash customers. Traditionally, service stations were not able to monitor cash transactions or cash customers for merchandising efforts or to provide these customers with benefits that were provided to card customers. The card customers provided the service station operators with information to determine what types of purchasing activities specific customers had in addition to providing the customer with various benefits based on prior purchases and transactions. For example, a system comparable to the central control system 50, alone or in conjunction with a remote host network 94, could track customer purchases and provide a benefit based on a purchase type or an amount of a series of purchases. Prior to applicant's invention, cash customers were basically "invisible" to these types of merchandising aspects of the fuel station environment.

Additionally, efforts have been made to provide cash acceptors at the fuel dispensers 18 to enable customers to pay cash at the dispenser in order to expedite the fueling transaction for the benefit of the station operator and customer. The difficulty in using cash acceptors is providing the customer proper change when the amount of fuel dispensed differs from the cash amount inserted into the cash acceptor 90. Although the fuel dispenser 18 is a sophisticated instrument, it is not economical to further include a change machine at each fueling position of each dispenser. Thus, cash acceptor technology has not caught on in most fueling environments. Furthermore, requiring a customer to enter the store to receive his or her cash refund or change defeats the purpose of paying at the dispenser. Similarly, since the customer's vehicle tank ullage is unknown, fueling to a prepaid dollar amount is often impractical and inconvenient to the customer.

The present invention provides a solution to the above problems by keeping track of cash customers and their respective refunds and loyalty points using transponder technology. A cash customer either carries a transponder or has a transponder mounted on his or her vehicle, and the transponder is used to associate any refunds or loyalty benefits with the otherwise invisible cash customer. The

16

customer may use the cash acceptor 90 of the fuel dispenser 18 and receive any change as credit on or associated with the transponder. The transponder may simply provide an ID and the central control system 50 or remote host network 94 will keep track of the refund associated with that ID for later credit. Alternatively, the refund amount or credit may be directly transmitted to and stored on the transponder wherein that amount is transmitted to a dispenser for credit on a subsequent fueling transaction.

With this invention, customer loyalty and merchandising programs are made available using a transponder associated with a cash customer. Whether the customer pays at the dispenser or at one of the registers inside the store, interrogators placed at the dispensers, registers or anywhere else in the store can interact with the customer transponder in order to keep track of loyalty points, benefit information or simply monitor the customer's purchasing habits. This information is preferably stored at the central control system 50, at a remote host network 94 or directly on the transponder.

Attention is drawn to FIGS. 11A and 11B depicting a flow chart representing basic interaction with the transponder of the cash customer. Typically, a new transaction begins when a cash customer having a personal transponder 12 or vehicle mounted transponder 14 drives up to a fueling position at one of the dispensers 18 and begins fueling (block 600). The customer will generally start a new transaction by beginning fueling (block 602). This is typically accomplished by initially interacting with the fuel dispenser user interface comprising the key pad and display 102, 100 to select a cash or credit transaction. The dispenser control system 80 will determine if the customer is making a cash transaction (block 604) and relay that information to the central control system 50. Although determining whether or not the customer is conducting a cash transaction occurs at the beginning of the fueling process in FIGS. 11A and 11B, this determination can be made anytime during the fueling operation and at virtually any payment location, including the register or transaction terminal in the store. 30

At this point, the dispenser control system 80, operating in conjunction with the dispenser interrogator 52, will retrieve the transponder ID (block 606). The dispenser control system 80 and central control system 50 will operate to retrieve information relating to prior transactions which may affect the current transaction. This information may be cash refunds from previous transactions, credits or loyalty points, or benefits based on prior transactions. Depending on system configuration, this information may be stored on the transponder, or at any of the control systems in the fueling environment, such as the central control system, in addition to being maintained at a remote host network 94 system communicating with other stations. When the information is stored on the transponder or at the remote network, loyalty programs and refund data is made easily attainable by other fueling environment systems. Thus, the dispenser 18 may retrieve prior transaction information from the transponder (block 608) or retrieve this information from a database stored at one of many control systems associated with the dispenser (block 610). Regardless of system architecture, some type of identification indicia is necessary to associate a particular customer's information with a corresponding transponder. Subsequently, one of the controllers associated with the dispenser such as the dispenser control system 80, convenience store transaction controller 152 or central site controller 232, will determine a transaction subtotal (block 612). The controller will apply any prior refunds, loyalty points or benefits the customer has accumulated due to the current transaction and/or any prior transactions (block 614). 60

A new transaction total is then determined (block 616).

Next, payment is received at one of the in-store registers, such as the in-store transaction terminal 30, or at the cash acceptor 90 of the dispenser 18 (block 618). Notably, initial dispenser authorization may depend upon receiving the cash payment at the beginning of the fueling operation and before fueling begins. The dispenser control system 80, or one of the associated controllers, will subsequently determine a refund amount and any loyalty points or benefits accumulated based on the current transaction and any earlier transactions, accordingly. The station operator has tremendous freedom in determining the criteria for issuing benefits and points based on a single transaction or a series of transactions. Depending on whether the information is stored directly on a transponder or elsewhere, the refund and loyalty information must be transmitted to the transponder through the appropriate interrogator, such as the dispenser interrogator 52 or the store transaction interrogator 54. The appropriate interrogator primarily depends on where the actual cash transaction takes place. If the information is not stored on the transponder, the information will be stored at one of the local control systems or the host network 94 (block 624). Once the transaction is over, the system will begin anew by waiting for another transponder-carrying cash customer (block 626).

Discount for Transponder Use

Another aspect of the invention is providing a system capable of applying a discount to a transaction when a transponder or other preferred method of payment is used. The system is preferably adapted to provide benefits or discounts to a transaction when a transponder is associated with the transaction to encourage transponder use, while avoiding cash payment or other less desirable payment methods.

Attention is now directed to FIG. 11C where a basic process for discounting a transponder related transaction is shown. As the process begins (block 630), a transponder is interrogated (block 632) and transponder indicia is received by one of the control systems in the fueling environment (block 634). The control system will proceed with the transaction (block 636) and will ultimately determine what type of method will be used for the transaction and what, if any, discount will be provided based on the chosen method of payment.

Initially, the control system will determine whether or not a transponder is being used in association with the transaction (block 638). If a transponder is being used, the control system will provide a first discount rate to all or a portion of the transaction (block 640), and proceed to determine transaction totals (block 650). If a transponder is not used in association with the transaction, the control system may determine whether or not a card, such as debit, credit or smartcard, is used with the transaction (block 642). If a card is used in association with the transaction, the control system may provide a second discount for all or a portion of the transaction (block 644), and proceed to determine transaction totals (block 650).

If there is no transponder or card associated with the transaction, the control system may determine whether or not the transaction is a cash transaction (block 646). This may be by default if no card or transponder is used, or may result from the customer selecting a cash transaction or an operator indicating a cash transaction at a POS position. If a cash transaction is determined, the control system is configured to provide a third discount rate to all or part of the transaction (block 648) and proceed to determine transaction totals (block 650).

The system operator may elect to provide different rates for the first, second and third discount rates associated with the transponder, card and cash transactions, respectively. Furthermore, the operator may elect not to provide a discount for all or any combination of the various methods of payment. Preferably, a greater discount is provided for transactions using a transponder in order to encourage transponder use with transactions. Similarly, to avoid the use of cash transactions, the system operator may decide not to provide any discount for cash transactions. Once the transaction totals are determined (block 650) and the appropriate discount rates are applied, payment is received (block 652) and the process comes to an end (block 654). Those skilled in the art should quickly recognize the benefits inherent in certain payment methods to improve transaction efficiencies and encourage methods of payment beneficial to the station operator.

Cash Prepay with Transponder

Another aspect of the present invention is to provide a system and method for providing a prepaid transponder capable of being used with dispensers and other POS terminals in a fueling environment. The present invention allows a customer to prepay for subsequent transactions at a terminal capable of communicating with the transponder in order to store the amount of prepayment on the transponder, or at least associate the amount of prepayment in a database associated with the terminal and any future transaction locations, such as a fuel dispenser.

Attention is directed to FIGS. 11D and 11E where a basic process for using a prepaid transponder is shown. When the basic process begins (block 660), a transponder is interrogated at a cash or other payment receiving terminal (block 662). The terminal will receive cash or other value (block 664), and either transmit to the transponder a value for the cash or other prepayment received or store that value in a database associated with the controller (block 666).

At this point, the transponder has value (or is associated with value) and is capable of being interrogated at various POS terminals. In this example, the POS is an interface at a fuel dispenser. During the transaction, the dispenser will interrogate the transponder (block 668) and authorize a transaction within the stored credit or value of the transponder (block 670). The transaction will proceed (block 672) and the appropriate control system will determine that the values incurred during a transaction remain less than the value of the transponder (block 674). As the transaction is monitored, the control system will stop or limit the transaction (block 684) before the value of the transponder is exceeded. As long as the transaction remains less than the value of the transponder, the transaction will proceed until completed (block 676). Once the transaction is complete, the control system will determine transaction totals (block 678) and transmit such totals to the transponder for accounting (block 680). Alternatively, these totals may be sent to a database corresponding to the respective transponder in order to keep track of prepayment and associated totals. The accounting may be done at the transponder, wherein the value of the transaction is received by the transponder and the appropriate calculations are completed. Alternatively, the control system may simply update the value associated with the transponder by either transmitting this value directly to the transponder or storing it in the databases associated with the transponder.

Preferably, the control system will interact with the transponder or the database maintaining the value associated with the transponder to determine the remaining transponder totals or value (block 682), and display such totals to the

customer (block 686). These totals may include the amount of prior transactions, the remaining value of the transponder before the transaction, or the value of the transponder after the transaction. The system operator will have great flexibility in deciding the various accounting information made available to the customer. Preferably, the information will be sufficient to allow the customer to recognize when the transponder value is approaching zero (0) or a predefined threshold to alert the customer that it is time to add value to the transponder.

For example, the control system may monitor the transponder value to determine whether that value is less than or equal to a predefined value, such as zero, or any other desired threshold. If the value is less than or equal to the set value, the control system may be configured to alert the customer of the current transponder value and that it has dropped below the threshold amount (block 690) and the process ends (block 692). If the transponder value is greater than the threshold, the system operator may elect not to provide a warning to the customer and end the process (block 692).

Notably, during any portion of the process described above, the control system may allow the customer to add value to the transponder at the current transaction terminal. For instance, the customer may use the cash acceptor or card reader at the fuel dispenser to add value to the transponder. The customer will simply determine an amount to add to the transponder, and the dispenser interrogator will simply interrogate the transponder and transmit the relevant added value information to the transponder or receive the transponder ID and update an associated database accordingly (blocks 662-666). Storing this value should be interpreted to include adding to or subtracting from an existing value or any other accounting necessary for operation.

Transponder Monitoring and Location Detection

In several aspects of the present invention, it is desirable to determine the location and/or proximity of a transponder, whether vehicle mounted or carried by a customer, with respect to a specific fueling position of a dispenser or interrogation system. In other aspects, it is desirable to track the transponder throughout the fueling environment. Although the embodiments described herein use the dispenser as a reference, any of the interrogation systems in the fueling environment may be adapted to determine transponder location and/or proximity.

Determining location and proximity of a transponder with respect to a fuel dispenser in a fueling environment presents a unique problem because the fueling environment includes multiple dispensers with multiple positions. At any given time, numerous transponders will be in or moving about the fueling environment and the many interrogation fields associated with the various interrogators. The dispensers and associated control systems must distinguish between personal and vehicle-mounted transponders used to carry out a transaction from transponders attached to a vehicle driving by the fueling position or carried by a person walking by the dispenser. Fueling environments must be able to avoid communicating with a second transponder during a transaction with a first transponder.

Texas Instruments has made an attempt at implementing a system in a fueling environment capable of communicating with transponders. The beta sites for the Texas Instruments system are believed to communicate with transponders using an interrogator transmitting an interrogation signal having a 134 kHz carrier. Any transponders within range of the 134 kHz signal will transmit a signal back to the interrogator using a 903 MHz carrier. The Texas Instruments

system includes a very large loop antenna associated with the dispenser for transmitting the 134 kHz signal and a much smaller antenna for receiving the 903 MHz signal from the transponder. The 134 kHz transmission signal from the interrogator has a very limited communication range, which requires the transponder to be within 2-6 inches of the large loop antenna to provide the transponder sufficient energy to transmit information back to the interrogator.

Additionally, the 903 MHz signal transmitted from the transponder to the interrogator is substantially non-directional and can be heard throughout the entire fueling environment and most likely for quite some distance outside the fueling environment. Transponder transmissions carrying throughout the fueling environment add significant difficulty in correlating a transponder with the proper dispenser and respective fueling position.

In addition to the inherent difficulties in locating and distinguishing between transponders within the fueling environment, the Texas Instruments system requires different types of antennas, modulation schemes and communication electronics for transmitting and receiving signals to and from the transponders. Given the limited operating field provided by the 134 kHz loop antenna, it may be difficult to communicate with vehicle-mounted transponders, which necessarily should never be within 2-6 inches of the fuel dispenser.

Applicants' invention provides a solution to the difficulties of locating and communicating with transponders within the fueling environment by (1) providing a communications system operating at frequency ranges which are very directional, (2) controlling the power at which the communications system operates and (3) simplifying the communications electronics by operating at the same carrier frequencies communicating with the transponder. Communicating at substantially the same carrier frequency allows interrogators to use the same or similar antennas to transmit and receive. Furthermore, these more directional frequencies require smaller antennas, which are easily integrated into the fueling environment or dispenser in an economical and aesthetically acceptable manner.

The preferred arrangement of applicants' antennas is shown in FIGS. 12A and 12B. In FIG. 12A, a side view of a fuel dispenser under an awning 248 is shown with multiple configurations of antennas adapted to communicate with various transponders proximate to either of the fueling positions A or B. The antennas are adapted to transmit, receive or transmit and receive at substantially directional frequencies, including those in the microwave range, and preferably around about 2.45 GHz. In these embodiments, there are basically three suggested antenna locations wherein various combinations of antennas at these locations are used. Please note that the antennas of FIGS. 12A and 12B are not referenced as 108, for the sake of clarity in describing antenna placement. As illustrated in FIGS. 12A and 12B, the antennas may be positioned within a cabinet of the fuel dispenser 18, or alternatively, the antennas may be positioned above the fuel dispenser 18.

The first antenna location is near the middle of a front face of the dispenser 18. A mid-dispenser transmit antenna 251 and mid-dispenser receive antenna 253 are placed near this midpoint. The antennas may be located in the central portion of the dispenser or located anywhere along the front face of the dispenser, including near the respective sides of the dispenser as shown in FIG. 12B. The mid-dispenser antennas 251, 253 preferably provide a limited power and limited range field pattern to communicate with a transponder 66 carried by a customer. The field provided by the mid-

dispenser transmit antenna 251 is preferably large enough to properly communicate with the customer-carried transponder 66 in the fueling position and in front of the dispenser without requiring the customer to remove the transponder from a purse, wallet or pocket and wave the transponder next to the dispenser 18 or a receiving antenna.

Additionally, a top-mount transmit antenna 255 and top-mount receive antenna 257 may be provided at or near the top of the dispenser 18 and adapted to provide a focused, directional and preferably conically shaped field downward over the respective fueling position. These top-mount antennas 255, 257 are preferably located on each side of the dispenser 18 as shown in FIG. 12B in similar fashion to the preferred placement of the mid-dispenser antennas 251, 253. The duplication and spacing of these antennas help avoid interference caused by people or other objects breaking the communication path between the respective antenna and transponder. This allows the transponder to communicate with the dispenser through one antenna or set of antennas, even if something blocks the field from the other set of antennas.

Another option is to place the antenna substantially directly over the fueling position A or B. In such an embodiment, overhead receive antenna 259 and overhead transmit antenna 261 are mounted over the fueling position A, B using an overhead antenna mount 263. The overhead antennas 261, 263 operate in the same manner as the top-mount antennas 255, 257, and may also be spaced apart to provide varying positions to create an interrogation field. Notably, the antennas for receiving and transmitting may be combined into one wherein a suitable circulator or like electronics 241 is incorporated into the interrogator or communications electronics to provide for reception and transmission from a single antenna. With any of these embodiments, the antennas may cooperate directly with the central control system 50 or with the dispenser control system 80 to allow overall system monitoring of transponders at the various positions. In these situations, the selected control system will alert the dispenser of transponder presence.

As noted, various combinations of these antennas can be used. For example, the preferred embodiment includes two mid-dispenser transmit antennas 251, two top-mount transmit antennas 255, and two top-mount receive antennas 257. The top-mount receive antennas 257 are adapted to receive signals transmitted from the transponder in response to signals from either the mid-dispenser transmit antennas 251 or the top-mount transmit antennas 255. In operation, when a customer-carried transponder 66 enters the field provided by the mid-dispenser transmit antenna 251, the transmitter reflects a signal which is received by the top-mount receive antenna 257. Alternatively, vehicle-mounted transponders 64 may enter the interrogation field provided by the top-mount transmit antenna 255 and respond with a signal received by the top-mount receive antenna 257.

The interrogation fields provided by any of the transmit antennas 251, 255, 259 may be adjusted to control the size and shape of the respective fields. For example, the system may be configured to more easily distinguish between transponders carried by a person and vehicle-mounted transponders by configuring the respective interrogation fields provided by the mid-dispenser transmit antenna 251 and the top-mount transmit antenna 255 or overhead transmit antenna 259, such that the respective interrogation fields do not overlap or overlap in a desired and select pattern. Thus, communications resulting from an interrogation with the mid-dispenser transmit antenna 251 indicate a transponder

carried by the customer while communications resulting from the top-mount or overhead transmit antenna 255, 259 may be indicative of vehicle-mounted transponders.

Attention is now drawn to FIGS. 12C and 12D, which depict a flow chart of a basic process for monitoring the location and position of a particular type of transponder using top-mount transmit antennas 255 or overhead transmit antennas 259 and a mid-dispenser transmit antenna 251 in conjunction with one or more top-mount or overhead-mount receive antennas 257, 261. In this preferred embodiment, one or more of the transmit antennas mounted substantially above the customer will alternate sending interrogation signals with one or more of the mid-dispenser transmit antennas 251. A response to either of these interrogation signals is received at a receive antenna mounted substantially above the customer, such as one of the top-mount receive antennas 257 or overhead receive antennas 261.

The basic operation of this embodiment begins (block 400) by alternately transmitting from the top and mid-mount antennas (block 402). The central control system 50 or dispenser control system 80 will monitor for responses from transponders within one of the interrogation fields (block 404). The control system will continue to monitor for a transponder response until a signal from a transponder is received (block 406). The control system will next determine from which transmission field the transponder is responding (block 408). In this embodiment, where the transmission fields alternate, the control system will simply determine if a transponder response was received during a time period when the top or overhead-mount antennas were generating the interrogation field or if the response occurred during the time the mid-dispenser transmit antenna 251 was generating the interrogation field.

Once the control system determines the field in which the transponder is responding, the appropriate location of the transponder is known (block 410). Typically, the transponder's response to the interrogation signal provides transponder identification indicia indicative of the type of transponder being interrogated (block 412). The type of transponder is generally vehicle mounted or carried by the person. Determining whether the transponder is vehicle mounted or carried by the person enables the control system to determine how to react to the presence of other transponders passing through the various interrogation fields during a communication with another transponder or make sure a transponder is properly located for the desired transaction. If the control system determines the transponder is one carried by a person (block 414) and that the transponder was within the mid-antenna field (block 416), the control system allows the transaction to continue (block 420). If the transponder is a customer-carried transponder that is not within the mid-antenna field (blocks 414 and 416), the control system will return to the beginning of the process (block 418). The latter situation is indicative of a transponder carried by the person being interrogated in one of the top or overhead antenna fields, which are preferably used to interrogate vehicle-mounted transponders exclusively. Thus, the system preferably ignores transponders carried by the person outside of the mid-antenna field, which is preferably focused in a manner requiring the customer to be substantially in front of the customer interface of the appropriate fueling position. The field associated with the mid-dispenser transmit antenna 251 is limited only by design choice and may extend several or more feet in front and to the sides of the fuel dispenser.

If the control system is communicating with a customer-carried transponder within the mid-antenna field, the control system may monitor for the continued presence of the

transponder in the mid-antenna field (block 422) or allow movement of the customer-carried transponder throughout the fueling environment (block 422). Notably, it is often desirable to only require the customer-carried transponder to be within the mid-antenna field long enough to start the transaction and fueling operation, and allow the customer to leave the fueling area during the fueling operation. Unlike a customer-carried transponder, the control system would preferably require the presence of the vehicle in the appropriate transmission field throughout the fueling operation for safety reasons. Regardless of how the control system monitors the presence or movement of the customer-carried transponder during the transaction, the transaction will continue until complete (block 426), wherein the process will begin anew (block 428).

If the control system determines a vehicle-mounted transponder is within the appropriate transmission field (block 414), the transaction will continue (block 430). Preferably, the control system will make sure that the vehicle has stopped moving and has been in position long enough to indicate a transaction associated with the responding transponder is likely. As noted above, the control system will preferably continue to monitor for the vehicle-mounted transponder's presence (block 432) throughout fueling. The control system is preferably capable of distinguishing responses from the vehicle-mounted transponder associated with the transaction from other personal or vehicle-mounted transponders entering one or more of the transmission fields (block 434). If a response to an interrogation signal is received that does not correspond to the vehicle-mounted transponder associated with the transaction, the response is ignored (block 436).

Preferably, the control system will ignore all responses of customer-carried transponders in the top-mount or overhead transmission fields. Erroneous responses from other vehicles are rejected based on the control system recognizing a response from a vehicle-mounted transponder having a different identification indicia from the vehicle-mounted transponder associated with the ongoing transaction. Likewise, the control system will ignore responses from transponders other than the authorized transponders to avoid communicating with transponders of other customers entering the field during a transaction. In such case, the control system may check the identification indicia to ensure communication continue with the appropriate transponder. During this time, the control system will continue with the transaction (block 438) until the transaction is completed (block 440).

If the transaction is not complete, the control system will continue to monitor for the presence of the vehicle-mounted transponder and any other transponders in the area (blocks 432-440). Once the transaction is complete (block 440), the process returns to the beginning (block 442). Although the preferred embodiment provides for mid and overhead transmission fields wherein transponder responses are received near the top or above the dispenser, those skilled in the art will recognize that numerous modifications of this configuration are within the inventive concept disclosed herein and subject to the claims that follow.

As noted, the interrogation communications system preferably communicates using substantially directional radio frequencies in conjunction with antennas configured to provide precisely shaped and directed interrogation fields. Communications at these frequencies are generally limited to line-of-sight communications wherein arranging the antennas to cover a common interrogation field from different locations avoids parallax and the effect of interference

from objects coming between the transponder and one of the antennas. Generally, communications will require the absence of metal objects coming between the antennas and transponders. Thus, when antennas are mounted within the dispenser, glass or plastic dispenser walls are preferable. Furthermore, vehicle-mounted transponders are preferably placed on the windows or behind non-metal portions of the vehicle to avoid interference.

Preferably, high-gain antennas are used to provide a highly directional and configurable cone shape covering an area most likely to include a transponder when a vehicle is properly positioned for fueling. The antenna range and transmission power is typically adjusted to provide the desired interrogation field while minimizing the potential for the transponder to reflect signals to antennas associated with other fueling positions.

Another benefit provided by an embodiment of the present invention is that spread-spectrum communications limits the likelihood that an interrogator in the system will synchronize with a transponder being interrogated by another interrogator. Thus, a preferred embodiment of the present invention provides for a communications system capable of distinguishing between transponder types, limiting the potential of transponders erroneously communicating with another interrogator, simplifying communications by using the same carrier for transmission and reception, extending the interrogation field to more easily communicate with vehicle-mounted transponders, reducing the size of the antennas required for communication, and allowing either the same or same type of antenna to be used for transmission and reception.

Alternate Antenna Configuration

Turning now to FIG. 13A, an alternative fueling environment is shown having a station store and the central control system 50 configured to communicate with each of the dispensers 18. Multiple vehicles 14 are depicted in and around the various fuel dispensers 18. Each of the dispensers may include an antenna 108. These antennas 108 may be operatively associated with a corresponding dispenser interrogator 52 and dispenser control system 80 (see FIG. 5). Please note that antenna placement will depend upon the application and may include placing the antennas anywhere in the fueling environment separate from the dispensers 18. Placing the antennas at non-dispenser locations is especially operable in applications where the antennas are used to determine transponder location.

The antenna 108 and dispenser 18 configuration in FIG. 13A is specifically adapted to determine the proximity of a vehicle relative to a particular fueling position A, B associated with each dispenser 18. The different reception patterns are depicted in association with the two left most dispensers 18. The circular reception pattern 250 would be used to determine the proximity of a vehicle with respect to a particular dispenser 18. Generally, only one antenna 108 is required for such an embodiment. As a vehicle approaches the dispenser having the circular pattern 250, the dispenser's corresponding interrogator 52 and dispenser control system 80 will receive a signal transmitted from the transponder 12, 14. The dispenser control system 80 will analyze certain characteristics of the signal received from the transponder, such as magnitude or strength, to determine a relative proximity to the dispenser. Typically, a dispenser 18 having an antenna configuration providing the basic circular pattern 44 is not able to distinguish at which side or fueling position A, B, the vehicle is positioned.

A dual-lobed pattern 252 associated with the second dispenser 18 from the left in FIG. 13A provides the dis-

penser control system 80 the ability to determine at which fueling position A, B the vehicle is located or approaching. In order to determine the particular fueling position A, B, a directional component is necessary in addition to the proximity component described above. To provide this directional component, multiple antennas may be used to create various types of reception lobes where the antennas may be configured to only receive signals from certain pre-set directions or areas. Regardless of the configuration, the dispenser control system 80 will monitor a characteristic of the signal determinative of proximity, such as magnitude or strength, in conjunction with determining the fueling position A, B to which the signal appears most proximate. In the dual-lobed embodiment 252, the dispenser control system 80 may measure the signal characteristics received at both antennas 108 to determine from which antenna the received signal was strongest in order to determine direction. Using directionally configured antennas will allow each antenna to focus on one fueling position. Alternatively, placing the antennas 107 in the forecourt under each fueling position allows for easy determination of vehicle placement relative to a fueling position as shown in FIG. 16.

The dispenser control system 80 may include electronics capable of detecting signal strength or magnitude and monitor for variations therein. The magnitude monitoring circuitry 256 preferably includes automatic gain control electronics feeding the received signal into an analog-to-digital converter. Signal strength is turned into an 8-bit digital string corresponding to a signal magnitude. The dispenser control system 80 will monitor the string for variations in signal strength. As the signal magnitude increases, the dispenser control system 80 will determine that the transponder is approaching, and vice versa.

The flow chart of FIGS. 14A and 14B outlines the process undertaken by the dispenser control system 80 to determine the proximity or location of a transponder 64, 66 with respect to a particular fueling position A, B of a dispenser 18. The process begins (block 700) with the dispenser control system 80 beginning to monitor for a transponder signal (block 710). The signal may originate from an active transmitter in the transponder or may reflect or scatter back to a dispenser interrogator 52 and antenna 108. Upon detection of a transponder signal (block 720), the dispenser control system 80 will monitor a characteristic, such as magnitude or phase of the signal (block 730). At this point, the dispenser control system 80 recognizes a transponder 64, 66 as near or approaching the dispenser 18 and continues to monitor for the presence of the signal (block 740). If the signal is lost or decreases, the dispenser control system 80 will determine that the transponder has left or is leaving the reception area and will begin to monitor for a new transponder signal (block 710). If the signal remains present and/or increases, the dispenser control system 80 will determine the proximity of the vehicle with respect to the dispenser (block 750). Preferably, the dispenser control system 80 will monitor to determine whether or not the signal strength is changing to ensure that the vehicle-mounted transponder 64 does not move during the fueling operation.

In order to determine the particular fueling position A, B at which the transponder is located, the dispenser control system 80 must determine which side of the dispenser the vehicle is at or approaching (block 760). The dispenser control system 80 may simply monitor the signal with antennas at or near the particular fueling position designed to receive using a directionally sensitive antenna configuration, such as the embodiment of FIGS. 12A and 12B, the dual-lobed configuration 252 of FIG. 13A, or the underground antennas 107 shown in FIG. 16.

Reference is again directed to FIGS. 14A and 14B. As a transponder approaches a particular fueling position A, B, the dispenser control system 80 determines if the transponder is within a certain fueling proximity (block 770). When the vehicle is within fueling proximity, it is in a position close enough for the fuel dispenser 18 at the corresponding fueling position A, B to allow fueling of the vehicle. If the vehicle is not within fueling proximity, the dispenser control system 80 continues to monitor the strength and direction of the signal (blocks 730-760). The dispenser control system 80 may determine whether the transponder or vehicle is within fueling proximity by simply receiving the transponder signal, receiving a signal magnitude above a predefined threshold, and/or determining whether the signal magnitude is changing, indicating that the transponder and vehicle are moving.

Once the vehicle is in position for fueling, the dispenser control system 80 activates the dispenser's fueling electronics as desired (block 780). During the fueling operation, the dispenser control system 80 continues to monitor for the presence of a signal in decision block 790. When the signal is no longer present, the dispenser electronics are deactivated at block 795, and the dispenser control system 80 monitors for the next transponder signal at block 7 causing the process to repeat.

FIG. 13B depicts an embodiment wherein the location of transponders may be tracked as they travel throughout the service station environment 10. In this embodiment, the dispensers 18 each include an antenna 108 capable of receiving a signal from a transponder 64. Preferably, signals from the antennas 108 are multiplexed together at the central control system 50. The various control systems will receive the transponder signal and monitor the location of the vehicle and determine the dispenser 18 and fueling position A, B at which the vehicle stops. The dispenser control system 80 may, for example, monitor a characteristic, such as the phase, of the signal received by the various antennas 108 associated with the dispensers 18 and use known computational techniques, based on the signal characteristics received at the various antenna locations, to determine vehicle location. One such technique using phase differences is triangulation.

Although the signal of only one vehicle transponder 64 is depicted, the various dispensers 18 and/or the central control system 50 may monitor for the presence and location of a plurality of vehicles to determine proximity, direction of travel and location throughout the fueling environment 10. Triangulation and other similar positioning and locating techniques generally require at least two antennas and provide better resolution as the number of antennas 108 increase. The location of the respective antennas 108 may be virtually anywhere in the fueling environment 10. Another alternative to multiplexing the various antennas located at the respective dispensers 18 or elsewhere in the fueling environment is to use multiple antennas in each dispenser or throughout the fueling environment 10. Additionally, a global positioning system (GPS) could be used to communicate vehicle position directly or through a remote network 94 to the central control system 50 and on to the fuel dispenser 18.

The flow chart of FIG. outlines the control process for the embodiment depicted in FIG. 13B. The process begins (block 800) and initially monitors for the presence of a transponder signal (block 810). Once the signal is received (block 820), the dispenser control system 80 monitors the characteristics of the signal for various antennas (block 830). The dispenser control system 80 will next determine the location of the transponder (block 840) using the monitored

signal characteristics at the various antennas to triangulate or otherwise determine vehicle location. The precise fueling position A, B of the corresponding dispenser 18 is determined (blocks 850 and 860) by calculating the position at which the vehicle stopped. The dispenser control system 80 for the dispenser where the vehicle stopped will determine if the vehicle is within the fueling area (block 870). If the vehicle is within the fueling area, the dispenser's fueling electronics are activated as desired (block 880). The dispenser control system 80 will continually monitor the location of the vehicle to determine if the vehicle remains within the fueling area (block 890). Once the fueling operation is over and the vehicle leaves the fueling area, the dispenser control system 80 deactivates the dispenser's fueling electronics (block 895) and monitors for a new transponder signal (block 810), whereupon the process is repeated.

With respect to FIG. 16, an embodiment depicting underground antennas 107 is shown. The two antennas 107 correspond to fueling positions A and B. The antennas are preferably multiplexed at an antenna multiplexer 256. The multiplexer 256 sends the multiplex signals received by the corresponding antenna 107 to the interrogator 52.

Preferably, intrinsically safe barriers are used to provide electrical isolation between the antennas and the multiplexer 256 and/or interrogator 52.

Dual-stage Preconditioning and Authorization Using Transponders

There are numerous examples of transponders being used in fleet-type applications for identifying a vehicle as being authorized to receive fuel at a specific fueling site. There are examples of radio frequency transmissions being used to interface with onboard vehicle computers for the purpose of transferring vehicle information to various locations, such as toll plazas, fuel dispensers and parking garages. A number of schemes are known for identifying an individual for completing financial transactions. These typically involve personal identification numbers (PIN), which are "secret" codes known only to the consumer and used in conjunction with financial account information in order to complete a transaction. These schemes typically include standard debit cards with associated PIN's, contact and contactless smart cards with associated PIN's, and smart-wired and wireless PIN pads used in conjunction with card reading devices such as the devices disclosed in U.S. Pat. No. 4,967,366 to Kaehier.

Consumers have reacted favorably as the petroleum retailing industry has accepted card readers in the dispensers as a means for reducing the time required to complete payment for gasoline transactions. However, both consumers and the industry desire still further improvements of transaction efficiencies. One aspect of the current invention is to use transponder technology in a fueling environment to simplify the financial payment operation associated with the transaction at a fuel dispenser and provide an enhanced level of security such that basic transponder communications cannot be "tapped" by unauthorized devices and personnel in order to replicate communications to generate fraudulent transactions. This aspect involves an initial radio frequency identification process to provide preconditioning of the fuel dispenser, followed by an authentication process to provide transaction security for the financial aspects of the transaction. The invention is applicable to both vehicle-mounted 64 and personal transponders 66, and, in certain embodiments, may require a second transponder associated with the vehicle or customer for the authentication step. The secondary authentication process may require the customer to enter a PIN, speak for a voice match, or supply a physical identifier, such as a fingerprint, or other biometric identifier.

Preferably, a voice print or other biometric signature of the customer is taken and stored in the transponder's memory or a database associated with the dispenser control system. Thus, the information must be received from the transponder or the database associated with the dispenser control system as necessary. Alternatively, a second transponder may be used for part of the process to supplement and authenticate the first transponder, or the first transponder may act alone and provide a secondary transmission capable of authenticating the first transmission.

Attention is drawn to FIGS. 17, 18A and 18B wherein a schematic and flow chart are depicted detailing the system and process of a preferred embodiment implementing dispenser preconditioning followed by a transaction authorization. In FIG. 17, a vehicle 14 has a first vehicle-mounted transponder 64 and a second vehicle-mounted transponder 65. The customer 12 may also have a personal transponder 66. Although not depicted, fuel dispenser 18 is preferably connected as discussed above with the central control system 50, and includes a customer interface having a display 100 and key pad 102, a dispenser interrogator 52 and an associated antenna 108. The dispenser may also include a microphone 258 operatively associated with audio processing circuitry 260 (see also FIG. 5) and a video camera 262. The microphone 258 and camera 262 may provide a bidirectional audio/video intercom between the dispenser 18 and the QSR or convenience store operator interfaces. In this application, the microphone 258, in conjunction with the audio processing circuitry 260 or the camera 262, may function to provide a voice print of the customer or an image of the customer to authenticate a transponder. Likewise, a fingerprint imager 264 may use a customer's fingerprint to authenticate the transponder.

With this dispenser architecture in mind, specific reference is made to the flow chart of FIGS. 18A and 18B. As a customer 12 approaches a fueling station (within vehicle 14), and, in particular, a fueling position at a dispenser 18, either the customer transponder 66 or vehicle transponder 64 is initially interrogated as the interrogator 52 monitors for the presence of a transponder (blocks 900 and 905). Typically, the interrogator 52 in conjunction with the dispenser control system 80 will continuously check to see if a transponder is present (block 910). If a transponder is not present, the dispenser control system 80 will continue to monitor for the transponder (block 905). If a transponder is detected, the dispenser control system 80 will receive indicia from the first transponder corresponding to the particular transponder's identification information (block 915). Preferably, the dispenser 18 will continuously monitor the transponder's location or proximity to a particular fueling position (block 920). Further information is provided relating to vehicle monitoring and positioning in applicants' U.S. patent application entitled INTELLIGENT FUELING filed on Dec. 6, 1996, Ser. No. 08/759,733, the disclosure of which is incorporated herein by reference.

Typically, the transponder is read using energy provided from the antenna 108 located on the dispenser 18, forecourt 16, or anywhere else in the fueling environment 10. The transponder may respond to this energy by providing signals to the dispenser interrogator 52. The dispenser control system 80 will operate to determine the general location or proximity of the vehicle 14 with respect to a corresponding fueling position at the fuel dispenser 18. Preferably, the dispenser interrogator 52 will maintain constant contact with the transponder. The dispenser control system 80 will monitor transponder communications to determine the fueling position at which the vehicle (and customer) stop (block 925).

Once the appropriate fueling position is determined, information received from the vehicle (or customer) transponder is used to "precondition" the fuel dispenser 18 (block 930). Preconditioning means readying the dispenser for the fueling transaction. The extent of readiness may vary with each application, but may include determining the proper fuel, fuel type, flow rates for the vehicle and/or running initial checks on account information, or simply initializing the pump electronics. For example, a fuel dispenser may be preconditioned to a point where fueling will be authorized once secondary information is received to authorize the information used for preconditioning and/or the transponder. The customer may also elect to receive select information or targeted advertising as discussed below under "Customer Preferences." The preconditioning may take place solely at the fuel dispenser control system 80, in conjunction with the central control system 50, or may require communication with an on- or off-site database, such as the remote network 94. Having achieved the preconditioning of the dispenser based on a first transponder indicia, which is generally related to transponder identification, the financial aspects of the transponder are subsequently authorized.

Receiving additional or second indicia is required for authorization in addition to the indicia received for preconditioning (block 935). One option is to have the dispenser control system 80 adapted to prompt the customer to enter a PIN on the key pad 102 so that both the transponder data and an associated PIN number are made available to the appropriate database as a matched pair in order to obtain authorization and subsequent payment information (block 940).

Another option is to receive the second indicia from a second transponder, distinct from the first transponder that initially transmits the information for preconditioning (block 945). In this embodiment, the first transponder may be either an additional transponder 65 on the vehicle 14, or the personal transponder 66 carried by the customer 12. If the first or preconditioning transponder is transponder 64 on the vehicle 14, the second transponder providing authorization may be a customer transponder 66 or the other vehicle transponder 65. If the first or preconditioning transponder is the customer transponder 66, the second transponder may be one of the vehicle transponders 64, 65.

As easily seen, many configurations are available where a first transponder transmits information for preconditioning, and a second associated transponder provides information for authorization. Once the first transponder provides the preconditioning indicia, the second transponder will subsequently provide second indicia from which authorization or authentication is derived. This secondary indicia may be an authentication ID which is matched in a database in one of the associated control systems with the ID or information received from the first transponder. If the information from both transponders corresponds appropriately, the transaction is authorized.

A third alternative is to provide a transponder capable of providing both the first preconditioning indicia followed by a secure or encrypted transmission representing the second indicia required for authorization or authentication (block 950). Preferably, the transponder is capable of processing data received from the dispenser interrogator 52, processing or encrypting the data and transmitting the data or secure code back to the dispenser for authorization or authentication. Again, one of the control systems associated with the dispenser will compare the original preconditioning indicia and the second authorization or authentication indicia before

authorizing the financial portion of a transaction and allowing the dispensing of and payment for fuel.

When only a customer transponder 66 is present (the vehicle transponder is not present), the transaction is initiated or preconditioned solely by the customer transponder 66 located on a key fob/ring or card. Upon selecting a fueling position, the customer will exit the vehicle and prepare for fueling. Preferably, the dispenser will read the customer transponder 66 and recognize that a vehicle transponder is not present. Such recognition may result from a vehicle transponder not being detected or information transmitted by the personal transponder indicating that a personal transponder is present or a vehicle transponder is not available. In this situation, the dispenser will prompt the customer for a PIN, which is compared with the information received from the transponder in order to authenticate the transaction. Optionally, the customer transponder is a secure, intelligent transponder capable of being read by the dispenser interrogator, providing information such as a code, performing a secured computation at the transponder, and responding with secondary information in order to validate the transponder and authorize the transaction.

Another option for secondary authorization or authentication indicia is to receive a voiceprint using the microphone 258 and audio processing circuitry 260 in conjunction with one of the associated dispenser control systems. Fingerprints may also be compared using the thumb- or fingerprint imager 264 (shown in FIG. 5).

Regardless of how the second indicia for authorization or authentication is received, one of the control systems will check the second indicia for authorization purposes as discussed above (block 955). If the control system determines the second indicia is not proper authorization or authentication of the first, preconditioning indicia, the control system will display a message indicating the transaction is not authorized (block 965) and will prevent fuel delivery. If the transaction is authorized (block 960), the control system will enable fueling (block 970) and monitor for the end of fueling (blocks 97 and 980) until the transaction ends (block 985).

With the embodiments requiring second indicia from the same or separate transponder for authentication or authorization, the transponder is adapted to bi-directionally communicate with the dispenser, which further communicates with a host network 94 in cooperation with the central control system 50 to provide secure authorization of the transponder(s) and to enable transactions. In certain applications, it is desirable to avoid transmitting data from which valuable account or financial information could be derived between the tag and the dispenser, or the dispenser and the host network 94. Preferably, all or a majority of the account or financial information requiring absolute security is stored only at the host network 94. Thus, in the preferred embodiment, neither the transponders, dispenser 18 nor central control system 50 has access to critical financial or account information. In more localized applications, the central control system 50 may have access to such information.

Certain embodiments of the present invention also provide high levels of security for transmissions. In order to avoid placing certain information at risk during transactions, the invention provides a unique identifier indicia for each transponder, and the host network maintains account and financial information associated with the transponder having the unique identifier. The identifier is transmitted to the host network 94 through the dispenser 18 and central control system 50. The host network 94 checks to see that the

31

transponder, and not a counterfeit, has provided the identifier. Once the host system determines that an authorized transponder sent the identifier, the host network 94 authorizes the dispenser to further interact with the transponder and authorize subsequent transactions based thereon.

Preferably, the transponder is authenticated using cryptography techniques known only by the transponder and host, but not by the dispenser or central control system 50. The preferred authentication or authorization process is shown in FIG. 19. In step one, the dispenser control system 80, in conjunction with the dispenser interrogator 52, generates and sends a random number (CRN) to the transponder. The transponder will encrypt the random number (CRN) and return the encrypted random number (TRN) to the dispenser along with a transponder identification number (ID) in step two. In step three, the dispenser 18 relays the transponder ID, the encrypted random number (TRN) received from the transponder, and the random number (CRN) to the host network 94 without modification. When using the host network 94, this information is transferred through the central control system 50. In more localized applications, the primary functions of the host network 94 may be provided by the central control system 50. In the preferred embodiment, the tag ID number is 10 bytes, the random number (CRN) is 8 bytes, and the encrypted random number (TRN) is 8 bytes.

Upon receipt of the transponder ID from the dispenser 18 (through central control system 50), the host network 94 calculates or looks up in a database a main transponder key associated with the transponder using the transponder ID. Preferably, the host network 94 will have initially generated the main keys stored in the transponder and will use the same keys to cryptographically communicate with the transponder. The host network 94 will have cryptography electronics adapted to encrypt the random number using the main transponder key and compare the result to the encrypted random number received from the transponder. If the numbers match, the transponder is a valid transponder, and most likely not a counterfeit. The host network will then use the ID number to look up transaction billing data or other customer related information corresponding to the transponder and authorize the dispenser to carry out the desired and authorized transactions in step four. Additional information is provided in U.S. patent application Ser. No. 08/895,417 filed Jul. 16, 1997, entitled CRYPTOGRAPHY SECURITY FOR REMOTE DISPENSER TRANSACTIONS in the name of William S. Johnson, Jr., the disclosure of which is incorporated herein by reference.

Transponder Theft

With the enhancements and transaction efficiency associated with using transponders, security concerns arise based on theft of information transmitted to and from the transponders, as well as theft of the transponders themselves. The present invention addresses the issue of stolen transponders in a number of ways. Preferably, a database is maintained, which keeps track of stolen or lost transponder ID's and is checked by the dispenser or central control system prior to authorizing each fueling operation in which transponders are used. The database may be kept at the dispenser, central control system 50, or at the remote network 94 for more regional and national protection. Where the transponder is intelligent, the dispenser control system 80 deletes a fraudulent transponder. The dispenser control system 80 may send a signal to the transponder 64, 66 to disable the transponder, act to inhibit future transactions, or alert other fueling environments when subsequent transactions are attempted. The basic flow of this theft deterrent and

32

prevention system is shown in FIG. 20 wherein a fueling process begins (block 1000) and the transponder ID is received (block 1005). In addition to the transponder ID, the transponder may inform the dispenser control system 80 that the transponder has been stolen or is being used by an unauthorized party. This theft or unauthorized use signal is preferably generated by the transponder in response to a dispenser in a subsequent transaction attempt transmitting a form of disabling signal to the transponder. Transmission of this signal is described in greater detail below.

The dispenser will next determine if the transponder is lost or stolen based on the signals received from the transponder by accessing a local or national database listing transponders which were lost, stolen or used by unauthorized parties (block 1010). After comparing the transponder ID with those listed in the database, the dispenser will decide whether or not the transponder is lost, stolen or being used by an authorized party (block 1015). If the transponder does not appear in the database, the dispenser will proceed with the fueling transaction (block 1020) until the end of the transaction is reached (blocks 1025 and 1030). If the dispenser determines that any use of the transponder is unauthorized from any one of the local or national databases, the dispenser will preferably interrogate the transponder to download any transaction history or information available on the transponder to help track unauthorized uses and determine the identification of the unauthorized user (block 1035). For example, the transponder may be able to track the various locations in which the user attempted to use the transponder. If the user attempted to use any identification means in association with this transponder use, the prior dispensers and control systems may have attempted to transmit this user identification to the transponder for subsequent transaction attempts.

As noted above, an important aspect of one embodiment of the present invention is the dispenser's ability to transmit a disable signal to the transponder to prevent authorizations of unauthorized users and subsequent transaction attempts (block 1040). The disable signal may simply be a signal informing the transponder that any subsequent use is unauthorized. The signal may completely shut down the transponder to prevent any subsequent communications or disable any transaction authorization features while maintaining communication ability. In the latter case, the transponder may be used to help track unauthorized transaction attempts and identify the unauthorized user.

The dispenser will also disable the present fueling operation and attempted transaction (block 1045) before delivering fuel or authorizing a financial transaction associated with the transponder. During this time, the dispenser will attempt to gather as much customer information as possible (block 1050). For example, the dispenser control system 80 may mark any type of identification information received from the user as well as record any physical information possible, such as marking video taken from the camera 262 or audio from microphone 258 (block 1050). The system may also alert one or more of the operators of the fueling environment and one or more security services via the local or remote systems (block 1055). The system may be tied into a network which will alert the police or simply update the security database in order to maintain transaction or attempted transaction histories (block 1060) and the process will end (block 1030). Upon determining a transponder has been lost, stolen or used in an unauthorized manner, the system may communicate with the transponders to effectively lock-out the dispenser as well as the transponder. Those of ordinary skill in the art will recognize that the preferred

embodiments disclosed herein will not limit the inventive concept disclosed or protected by the claims that follow.

Drive-off Prevention

Similar to the theft prevention and general prevention of transponder use by unauthorized persons, steps must be taken to prevent authorized customers from using the transponder in unauthorized ways. Of primary concern is preventing a customer from driving off before paying for the fuel or any other purchases made at the dispenser or anywhere else in the fueling environment. In many situations, the complete financial transaction will require more than a purely remote interaction between the dispenser and transponder. The customer may be required to provide additional payment means, such as cash or a credit/debit/smart card. In a situation where the product or service may be delivered before the transaction is completed, the present invention will act to deter or prevent repetition of this event in the future. Notably, not all drive-offs are intentional, and the transponder may act with various fueling environments to remind the customer at a subsequent fueling transaction that a drive-off occurred during a previous operation.

The flow of an embodiment of applicant's drive-off prevention process is shown in FIG. 21. The fueling operation will begin (block 1100) wherein the dispenser will receive transponder identification indicia, which is generally the transponder ID (block 1105). The dispenser control system 80 and/or central control system 50 will monitor the transaction to detect a drive-off condition (blocks 1110, 1115). The system will generally monitor for the drive-off condition until the transaction is both physically and financially complete. If a drive-off condition is detected (block 1115), the dispenser will transmit a drive-off signal to the transponder indicating the drive-off condition has or is occurring. The system will quickly gather any customer information from the transponder and from the fueling environment (block 1125) in the same fashion discussed with transponder theft. The dispenser will also alert the system operator, security personnel and, most importantly, the customer (block 1130). In many situations, the customer may have simply forgot to complete the transaction or may decide to abort the attempted drive-off after hearing the alert. If a drive-off occurs in spite of these warnings, a database associated with the local central control system 50 or the remote network 94 is updated accordingly. Once this database is updated, subsequent transactions will be prevented when the database is accessed to determine if prior drive-offs have occurred (see block 1110). Alternatively, a transponder disable signal may be sent to the transponder before leaving the fueling area to lockout future transactions, as discussed in the previous section. The customer may be informed of the drive-off at the subsequent location in an attempt to perfect the prior transaction in which the drive-off occurred.

Transaction Guidelines and Limitations

Another unique aspect of an embodiment of the present invention is the ability to use transponders to provide guidelines and limitations on transactions associated with the transponder. These transactions may be cash, credit or debit type transactions so long as a transponder is communicably associated with the dispensing system somewhere before, during or after the fueling or purchase transaction. These guidelines and limitations on customer purchases are either stored in a database in association with a transponder ID and accessible by the dispenser or central control systems 80, 50 or transmitted from the transponder to the dispenser during each transaction. Regardless of the manner of access, the dispenser control system 80 and the central control system 50 will cooperatively operate to carry out transactions according to these guidelines and limitations.

Attempts to circumvent the guidelines or limitations will preferably result in a message to the customer or operator that the item or service presented for purchase is not available to that particular customer when the transaction is associated with the customer transponder. These guidelines and limitations may affect both fueling and non-fueling transactions. The guidelines and limitations may be used to set a particular dollar amount or limit what the customer associated with the transponder may spend, as well as limit the frequency and the types of purchases made by the customer. For example, parents may place limits on their children's spending amounts, snack purchases or the frequency of fill-ups, in addition to preventing the purchase of alcoholic beverages. Given the tremendous latitude made available with using such transponders for transactions, authorization controls provide safety and security features making the tasks of those supervising the customers associated with the transponders significantly easier. The invention is particularly useful for fleet fueling applications wherein drivers are limited to selected purchases and purchase amounts.

With these concepts in mind, attention is directed to FIG. 22 depicting a general flow of a fueling or purchase transaction wherein transponder guidelines or limitations are enforced. Typically, the fueling operation will begin by a customer driving up to a fuel dispenser and an associated transponder transmitting identification indicia to the dispenser (block 1200). The dispenser control system 80 will receive the transponder identification indicia via the interrogator 52 (block 1205). At this point, the dispenser control system 80 and/or the central control system 50 will receive transaction guidelines from a database kept at the central control system 50 or the remote network 94. Alternatively, the dispenser control system 80 may receive the transaction guidelines directly from the transponder (block 1210).

Throughout the fueling operation, one or more of the control systems will monitor the operation to maintain fueling according to any guidelines or limitations as set forth above (block 1215). Additionally, the control systems will operate to monitor non-fuel transactions occurring before, during or after fueling to ensure that any guidelines or limitations are followed (block 1220). The non-fuel transactions may take place at the dispenser 18 or at one of the transaction terminals 30, 34 in the fuel station store. The control systems will monitor the purchases entered into the graphical user interface or scanned in by the operator. If the type, amount or frequency of the purchase is not within the guidelines or limitations, any such items are identified and the operator is alerted as necessary (block 1240).

If all of the fueling and non-fueling transactions are within the guidelines and limitations, the transaction is authorized (block 1230) and the transaction is ended (block 1235). The portions of the transaction which are authorized, if any, are allowed (block 1245) and the transaction is ended (block 1235).

Creating a Shadow Ledger

Given the significant advances in remote communications technology, remote communications units, or transponders as referred to herein, have ever increasing computational capabilities. As shown in FIGS. 4A and 4B, the transponders may have one or more controllers 124, 142 and a significant amount of associated memory 126. As noted, the transponders may be passive or active and may provide significant data processing and memory storage. In these "smart" transponder embodiments, it is preferable to keep a running tally of financial and transactional information. This is especially useful in 'smartcard-type' embodiments wherein

the transponder will actually provide prepaid functions directly on the transponder. In order to provide additional transaction security and tracking, a further aspect of the present invention is creating a shadow ledger at the central control system 50 or the remote network 94 of the transaction information stored on the transponder. This shadow ledger is updated during communications with the transponder. In this manner, transponder account information may be checked and the shadow ledger may be updated regarding transactions occurring outside of the fueling environment or associated transaction network.

Turning now to FIG. 23, a block diagram of the transponder 12, 14 is shown having controller communication electronics 124, memory 126 and software 128 sufficient to provide a transponder ledger 270. The transponder 64, 66 will communicate with a fuel dispenser interrogator 52 of a fuel dispenser 18. The fuel dispenser control system 80 will cooperate with the central control system 50 and its controller 232 to provide transaction and other transponder information to a remote network 94. The remote network 94 includes sufficient memory to provide a network ledger 272 for the particular transponder 64, 66 in communication with the fuel dispenser 18. The network ledger 272 is compared and updated as necessary during transactions involving the transponder 64, 66. Alternatively, a local ledger 276 may be kept at the central control system in memory 234.

The basic process of maintaining a shadow ledger apart from the transponder is shown in FIG. 24. As a transaction process begins (block 1310), the dispenser 18 will receive transponder identification indicia (block 1320). The identification or other indicia may also indicate whether or not a transponder ledger is being kept or provide sufficient information to allow one of the control systems associated with the dispenser to access a database indicating whether or not there is a ledger for that particular transponder.

Next, the transponder will download the information in the transponder ledger 270 to the dispenser interrogator 52 and controller 80. The dispenser control system 80 will subsequently relay the transponder ledger information to the central control system 50 if a local ledger 276 is kept or relay the information to the host network 94, if a network ledger 272 is provided. The shadow ledger (local or network) is accessed for the particular transponder using the transponder identification indicia (block 1340) and the transponder and shadow ledgers are compared (block 1350). If the ledgers equate, no update is necessary and the process is ended (block 1360 and 1380). If the ledgers do not equate (block 1360), the shadow ledger is updated (block 1370) and the process is ended (block 1380). Keeping a shadow ledger and updating it as necessary when communications are available with the transponder provides additional security for transponder transactions, indicates transactions occurring outside of the ledger system or associated network, and provides an up-to-date accounting accessible when the transponder is unavailable for communications.

Transaction Tracking

The present invention also provides an embodiment adapted to track transponder transactions throughout a number of fueling environments operatively associated with the host network 94. The basic flow of transaction tracking is shown in FIG. 25 wherein a typical fueling operation begins (block 1400) by a transmission from the transponder of transponder identification indicia to the dispenser 18 (block 1410). During the transaction, transaction information is received from the transponder and/or gathered by the dispenser and central control systems (blocks 1420 and 1430). The information received and gathered preferably includes infor-

mation such as the type of transaction, the dollar amount per transaction, frequency of transactions, and the location of these transactions. The information gathered by the central control system 50 may be relayed to the host network or major oil company network 94 (block 1440). The information is updated and compiled at the host network (block 1450) to enable study of customer activities and transactions. This information is very valuable in advertising and merchandising in the fueling environment. Once the information is compiled at the network 94, the process is ended (block 1460).

Customer Preferences

The present invention may also provide a feature adapted to personalize a fueling operation on a customer-by-customer basis. The dispenser 18 will interrogate the transponder and receive customer preferences or an ID, which will allow the dispenser or associated control system to access customer preferences, early in the fueling operation. Preferably, the information is accessed as the customer approaches the dispenser to enable the dispenser and associated systems to provide the customer with a personalized greeting, pre-selected information, such as news, traffic, weather, scores or stock reports in addition to providing customer selected advertising, merchandising or entertainment presentations. Typically, a customer fills out information relating to the types of information, greetings and multimedia presentations he or she would be interested in receiving during a fueling operation. The information is entered into a database associated with the transponder ID or actually stored on the transponder in a format capable of instructing the dispenser or central control system accordingly.

Reference is directed to FIGS. 26A and 26B. Once the customer preference information is in place, fueling processes will begin (block 1500) wherein the dispenser 18 receives transponder identification indicia (block 1505). The dispenser 18 will cooperate with the central control system 50 and remote network 94 as necessary to receive and access customer preferences. Alternatively, the preferences may be downloaded from the transponder directly. The preferences may precondition fuel delivery (block 1515) by selecting the desired type of fuel and fuel grade, and providing a personalized greeting (block 1520). The greeting may be configured to visually and/or audibly provide a message such as "good morning" or "good afternoon Mr. Hartsell." Additionally, a customer may have selected preferences as to the type of advertising and merchandising provided by the display 100 and audio/video electronics 86.

The advertising may come from a dedicated auxiliary audio/video source 156, such as a laser disk player or digital video disk (DVD) as well as via the remote network 94. The network 94 may be associated with the Internet. The Internet provides a wide range of multimedia capabilities to the fueling environment relating to remote control and information dissemination. Attention is drawn to U.S. patent application Ser. No. 08/896,988 for INTERNET CAPABLE BROWSER DISPENSER ARCHITECTURE, filed Jul. 18, 1997, in the name of Russel D. Leatherman et al. The disclosure of this application is incorporated herein by reference.

Similarly, the customer may elect to receive audio/video entertainment (block 1530), such as brief videos or music provided to make the customer's visit to the fueling environment more pleasurable. Additionally, the customer may elect to receive a wide variety of information relating to news, weather, scores, stock updates and traffic reports, just to name a few of the types of information available (block

1535). As noted, this information may be gathered and distributed locally by the central control system 50 or accessed via the remote network 94. Associating the central site control system with the Internet will allow significant access to various types of information.

Given the tremendous amount of information capable of being provided at the dispenser based on customer selection or independent merchandising, the present invention also provides for suppressing the presentation of certain information as desired by the customer (block 1540). For example, certain customers may not want to receive advertisements for tobacco products, alcoholic beverages or snack products. Preferably, any of the information may be suppressed upon customer election and use of the transponder.

In addition to suppressing available information, a customer is also provided the ability to change or override a preference previously elected during initial setup (block 1545). Typically, the customer is queried via a prompt on the video display 100 of the dispenser 18 to change or override a certain preference. Upon receiving customer input via the key pad 102, 104, the dispenser control system 80 (possibly in conjunction with the central control system 50) will override and/or change the information provided on the display 100. Changing the preference may include providing a customer with a menu of available information display options. Thus, the dispenser control system 80 will monitor the key pad 102, 104 for a customer response (block 1550). If the customer responds accordingly (block 1555), the preference is modified or changed (block 1560) by simply canceling the preference or selecting a new preference from a displayed menu. The preference may be made temporarily or permanently by updating the database and/or sending an appropriate control signal to the transponder. After the preference is changed, the dispenser will operate to continue the fueling operation (block 1565) until the operation comes to an end (block 1570). If the customer does not elect to change a predefined preference, the dispenser control system 80 will simply continue fueling until the end of the fueling operation (blocks 1565 and 1570). The dispenser may recognize other preferences to precondition the fuel dispenser for the impending fueling operation, including selecting a card type, payment method, account type, or other related transaction information to prepare the dispenser for fueling and carrying out the transaction. The customer may also elect to receive specific types of advertising and merchandising. Based on these elections, system operators may provide additional independent but targeted advertising and merchandising.

Preventing Fueling of Unauthorized Containers

The present invention may also provide for ensuring a container is proper for receiving and carrying fuel delivered by the dispenser 18. With reference to FIG. 27, a dispenser 18 is shown having a delivery hose 76 and nozzle 78 for delivering fuel to a vehicle or other acceptable container 280. Preferably, the container 280 is a fuel container manufactured to reduce the risk of igniting the fuel carried therein. The container 280 includes a body 282 having a spout 284, filling aperture 286, handle 288 and a transponder 290. Although active or passive transponders are acceptable for this aspect of the invention, a passive transponder, acting as a true transponder, is preferable. The transponder 290 is designed to reflect an interrogation signal sent from the dispenser interrogator 52 under the control of the dispenser control system 80. Upon receiving the interrogation signal, the transponder 290 will transmit a signal indicative of the type of container and whether that container is acceptable for carrying fuel.

Attention is drawn to the flow chart of FIG. 28 depicting the basic process of monitoring and detecting acceptable containers for fueling. At the beginning of the process (block 1600), the dispenser control system 80 will cause the dispenser interrogator 52 to transmit an interrogation signal in order to interrogate the transponder 290 (block 1605). When a transponder is within the interrogation field, it will transmit a signal in response to the interrogation signal. The dispenser interrogator 52 will receive this transponder signal, which typically includes indicia of the transponder type or an identification indicia allowing the controller to access a database to determine the type of transponder in communication with the dispenser (block 1610). The transponder may indicate that it is a personal transponder carried by the person, such as a card or key fob, a vehicle-mounted transponder or, in this particular instance, a stand-alone fuel container. Whether the transponder signal directly indicates the type of container being fueled or a database is accessed based on the transponder ID, the dispenser control system 80 or an associated control system is adapted to determine if the container is acceptable for receiving fuel (block 1615). The transponder indicia or database may also indicate the type or grade of fuel for the particular container.

If the container is not an acceptable container (block 1620), the dispenser control system 80 will provide an audible or visual signal to the customer and/or operator indicating that the container is not acceptable for receiving fuel (block 1625). The dispenser control system 80 will also act to prevent fueling by deactivating the pump and fueling electronics (block 1630) and the process ends (block 1635). If the control systems determine that the transponder is in an acceptable container (block 1620), fueling is authorized (block 1640) and fuel delivery begins (block 1645). A proper container may be a vehicle fuel tank wherein the vehicle-mounted transponder 64 will enable the control system to recognize the vehicle as an acceptable container. In certain embodiments, the vehicle transponder 64 may be mounted on or near the vehicle's fill neck.

Preferably, the dispenser will continue communications with the transponder to ensure that the transponder remains present during the fueling operation and, optionally, the dispenser may monitor movement of the transponder during this fueling operation (blocks 1650 and 1655). If no movement is detected and the transponder is present throughout fueling, the operation will end once the container is full and the customer stops fueling. If the transponder is moved or leaves the presence of the interrogation field, fueling is brought to a halt (block 1660 and 1635). If the transponder is moved and/or the dispenser determines that the transponder is no longer present and the fueling operation is in progress, the controller 80 may act to warn or instruct the customer accordingly in addition to halting the fueling operation. If the container 280 stops moving or is brought back to a proper fueling location, the dispenser 18 may be adapted to continue fueling as part of the same transaction. The proximity or location monitoring features of this aspect of the invention are discussed in greater detail above.

Restricting fueling to authorized containers in the manner described above greatly reduces the risk of severe bodily injury or death, not to mention substantial property damage that can occur when highly flammable fuels are carried in improper containers. In the preferred embodiment, the addition of a small passive transponder to a fueling container is minimal and modifying a dispenser 18 having an existing interrogator is basically updating software to recognize the information received from the transponder during interrogation. Notably, although a classical transponder is the

preferred embodiment, as noted earlier in the specification, a transponder is used in a most generic sense and is deemed to include remote communication units having a receiver, a transmitter, or a combination thereof.

Pre-transaction Estimates

The present invention may also provide pre-transaction estimates of the amount of fuel required to fill the vehicle's tank along with the estimated total cost of filling the vehicle. This embodiment requires a vehicle-mounted transponder operatively associated with a vehicle control system or, at a minimum, the vehicle's fuel tank in a manner wherein the transponder is able to receive or determine information relating to fuel tank ullage. The ullage information may include the amount of fuel required to fill the tank, tank size and/or the quantity of fuel remaining in the tank. This information may be passed to the transponder and then to the dispenser, or used to generate data to be communicated to the dispenser. Ullage information is any type of information which relates to tank ullage or from which ullage can be derived. The ullage here refers to the volume of the tank which can receive additional fuel.

Referring now to FIGS. 29A and 29B, the basic process of providing customer pre-transaction estimates with a vehicle transponder is shown. The process begins (block 1700) when a customer drives up to a fueling operation and the associated transponder is interrogated by the dispenser interrogator 52 under the control of the dispenser control system 80. Generally, the transponder will return identification indicia (block 1705). The transponder may also return indicia indicating the transponder type. Alternatively, the transponder type may be included in the transponder identification indicia or sent separately to enable the dispenser control system 80 or other associated control system to determine the transponder type.

As discussed above, determining the type of transponder is helpful in many situations, such as determining whether a container is authorized for receiving fuel or allowing a personal transponder to leave the immediate fueling position during a fueling operation, while acting to prevent a vehicle-mounted transponder from leaving the fueling position. The dispenser control system 80 or associated control system may also use the transponder identification indicia to access a database correlating the type of transponder with the identification indicia. Distinguishing transponder types is discussed in detail in U.S. patent application Ser. No. 08/966,237 filed Nov. 7, 1997, in the name of William S. Johnson, Jr. and entitled TRANSPONDER DISTINCTION IN A FUELING ENVIRONMENT, the disclosure of which is incorporated herein by reference.

Regardless of the type of identification indicia transmitted to the dispenser 18, the dispenser control system 80 (in cooperation with other control systems, if necessary) determines the transponder type (block 1710). Next, it is determined whether the transponder communicating with the dispenser is a vehicle transponder (block 1715). If it is not, the fueling operation will proceed (block 1795) and continue until fueling has ended (block 1785), wherein the process comes to an end (block 1790).

If the transponder is a vehicle transponder (block 1715), it is determined whether or not the vehicle transponder is an integrated transponder capable of accessing ullage information (block 1720). This information is preferably derived from the transponder identification indicia and transponder type information transmitted to the dispenser. However, any manner of communicating this information to the dispenser is acceptable and within the inventive concept of the present invention. If the transponder is vehicle-mounted but not

integrated to obtain ullage information, the fueling operation will start (block 1795) and continue until fueling has ended (block 1785) wherein the process is ended (block 1790).

If it is determined that the transponder is integrated and adapted to provide ullage information (block 1720), the dispenser must determine whether the customer wants an estimate of the transaction amount (block 1725). Typically, the estimate will be associated with completely filling the vehicle's fuel tank. The customer may provide a request for the fill-up at the dispenser by entering a response on the key pad 102 based on a prompt or query displayed on the display 100 (block 1730). Alternatively, the transponder may relay information during communications with the dispenser indicating that the customer has pre-authorized the dispenser to calculate an estimate associated with fueling the vehicle (block 1730).

If the ullage information has not already been received during initial interrogation, the dispenser interrogator 52 will interrogate the transponder 64 for the ullage indicia (block 1735) and receive the ullage indicia accordingly (block 1740). Based on the ullage indicia, the dispenser control system 80 or associated control system will determine or calculate the vehicle's tank ullage based on the ullage indicia received (block 1745).

The ullage indicia may include the exact ullage value representing the amount of fuel required to fill the tank, or the ullage indicia may indicate tank volume and the amount of gas currently present in the tank, wherein the control system will run the appropriate calculations to determine ullage. In yet another embodiment, the ullage information may simply include vehicle identification and remaining fuel indicia, and the control system will access a database at the central control system 50 or at the remote network 94 storing information relating to tank size for the identified vehicle. Those of ordinary skill in the art will quickly recognize various ways of obtaining ullage information. These ways are considered within the scope of this disclosure and any related claims which follow.

Once ullage is determined, the control system preferably determines or calculates an estimated cost of fueling the vehicle based on the ullage information. In order to do so, the type of fuel and fuel grade must be determined (block 1750). The dispenser controller may provide a prompt at the display 100 for the customer to select the type of fuel and grade desired for fueling (block 1755). Alternatively, the initial information received from the transponder may provide information on the type and grade of fuel desired for fueling, and the associated control system will determine fuel type and grade accordingly (blocks 1750 and 1755).

Once tank ullage and the type and grade of fuel are determined, the associated control systems will calculate the estimated cost for filling the vehicle (block 1760) by multiplying the ullage value by the fuel cost. Preferably, the estimated fuel quantity and the cost for fueling the vehicle with the selected type and grade is displayed to the customer on the display 100 (block 1765). At this point, the customer is given the option to continue with fueling. The customer may, for example, be provided with a prompt to begin fueling (block 1770) wherein the customer will respond by pressing a key on the key pad 102 (block 1775). If the customer elects not to fuel based on this information, the fueling operation is ended before it ever begins (block 1795). If the customer elects to continue fueling, the dispenser will start the fueling operation (block 1780) and continue fueling until the tank is full or the customer otherwise ends the operation (block 1785) wherein the process comes to an end (block 1790).

Determining estimated fueling totals benefits customers in many ways, especially customers wanting to pay cash at the dispenser using the cash acceptor 90 (shown in FIG. 3). As noted earlier, the difficulty with cash acceptors is providing the customer with the proper change when the amount of fuel purchased is less than the dollar amount required to fill the vehicle tank will allow the customer or dispenser to calculate a dollar amount which will not exceed an amount required to fill the vehicle. For example, the dispenser may determine that it will take \$21.60 worth of premium, unleaded gasoline to fill the vehicle tank. If the customer only has two ten-dollar bills and a five-dollar bill, the customer will know that if the two ten-dollar bills are placed in the cash acceptor, he will come substantially close to maximizing the amount of fuel delivered to the vehicle without needing change.

Although the customer can elect to purchase any amount of fuel, it is often beneficial to determine how much fuel the vehicle will accept before determining how much fuel one wishes to purchase. In certain applications, the cash acceptor could be monitored to determine the amount of cash received and take appropriate action if the estimated filling total could not meet or exceeded that amount. In summary, the dispenser associated control system may determine if change is necessary, based on the ullage information, the fuel selected and the amount of cash received by the cash acceptor.

Attention is drawn to FIG. 30 wherein a process is shown for providing a customer with estimated cost totals in order to make decisions on the amount of cash to enter into a cash acceptor for payment. The process begins (block 1800) where the dispenser control system 80 receives ullage information, fuel type and grade as discussed above (block 1805). Based on this information, the amount of fuel necessary to fill the vehicle and a corresponding cost estimate is calculated and displayed to the customer (block 1810). The customer may make fueling decisions based on this information, such as deciding what type of payment to make or how much fuel to purchase.

Assuming the customer is using a cash acceptor, the dispenser control system 80 will operate in conjunction with the cash acceptor 90 to determine the amount of cash payment (block 1815). If the payment made is less than the estimated cost of fueling (block 1820), then the dispenser control system 80 will allow fueling for the amount of payment (block 1825) until the operation is ended (block 1830). If the customer has placed more cash in the cash acceptor than necessary to completely fuel the vehicle (block 1820), the dispenser control system 80 will act to inform the customer that change will be required, preferably, using the display 100 (block 1835). The dispenser control system 80 will next prompt the customer using the display 100 on how to receive change (block 1840). The customer may be required to receive credit on his or her transponder or go into the station store and obtain change at one of the transaction terminals, just to point out a couple of options. Additionally, the dispenser may provide a customer with the choice to opt out of the transaction (also block 1840). The dispenser control system 80 will determine whether or not to refund the customer's initial payment (block 1845) based on a customer input received at key pad 102 (block 1855). If a refund of the payment is not desired and the customer chooses to receive change by other means, fueling will begin (block 1850) until the process ends (block 1860). If a refund is requested by the customer (blocks 185 and 1845), the dispenser control system 80 will cause the cash acceptor 92

to eject the customer payment (block 1865) and the process is ended (block 1860). Those skilled in the art should quickly recognize the added benefit in providing customer information before fueling relating to the amount of the potential fuel purchased, especially in light of the difficulties in receiving change associated with cash acceptors.

It should be recognized that the various aspects discussed herein can be mixed and matched to provide a fueling environment with various combinations of capabilities. Each aspect was discussed individually in order to provide a more clear disclosure. Furthermore, the various flow charts and processes disclosed herein generally represent programs which are stored in memory and run on an associated controller. Given the shared control responsibilities between the dispenser control systems and the central control system in a typical fueling environment, the control systems defined in the claims that follow are to be construed as including control features provided by dispenser control systems, central control systems and remote network control systems, alone or in combination. Those skilled in the art will recognize the tremendous flexibility in providing the various control aspects throughout the numerous control systems (including remote networks) in and outside of the fueling environment. Certain modifications and improvements will occur to those skilled in the art upon a reading of the foregoing description. It should be understood that all such modifications and improvements have been deleted herein for the sake of conciseness and readability, but are properly within the scope of the following claims.

What is claimed is:

1. A system for providing a predefined parameter defining a transaction guideline or limitation in association with a customer's remote communication unit comprising:

- a) wireless communication electronics adapted to receive signals including indicia from a remote communication unit associated with the customer, said wireless communication electronics positioned inside a cabinet of a fuel dispenser;
- b) a transaction interface for carryout of transactions initiated by the customer;
- c) a control system and memory associated with said communication electronics and said transaction interface; and
- d) said control system adapted to receive said indicia from said remote communication unit in response to an interrogation initiated by said control system and control a transaction at said transaction interface involving said remote communication unit according to the customer's redefined parameter defining a transaction guideline or limitation associated with said remote communication unit,

wherein said customer's predefined parameter defining a transaction guideline or limitation limits a transaction to a select type of fuel to be dispensed from the fuel dispenser.

2. The system of claim 1 wherein said control system includes a dispenser control system located within the fuel dispenser.

3. The system of claim 2 wherein said control system includes a central site control system located apart from the fuel dispenser.

4. The system of claim 1 wherein said wireless communication electronics are integrated into a face of the fuel dispenser.

5. The system of claim 1 wherein said wireless communication electronics are secured to a front face of the fuel dispenser.

6. A system for providing a predefined parameter defining a transaction guideline or limitation in association with a customer's remote communication unit comprising:

43

a) wireless communication electronics adapted to receive signals including indicia from a remote communication unit associated with the customer, said wireless communication electronics positioned within a cabinet of a fuel dispenser;

b) a transaction interface for carryout of transactions initiated by the customer;

c) a control system and memory associated with said communication electronics and said transaction interface; and

d) said control system adapted to receive said indicia from said remote communication unit in response to an interrogation initiated by said control system and control a transaction at said transaction interface involving said parameter defining a transaction guideline or limitation associated with said remote communication unit; wherein said customer's predefined parameter defining a transaction guideline or limitation limits a transaction to a select grade of fuel.

7. An interrogation system associated with a fuel dispensing system for enforcing a predefined parameter defining a transaction guideline or limitation associated with a customer's remote communication unit, said system comprising:

- a) a customer transaction interface associated with an interrogator for communicating with a remote communication unit associated with the customer; and
- b) a control system and memory associated with said interrogator;

said control system adapted to interrogate said remote communication unit with said interrogator during a transaction and control said transaction according to the customer's predefined parameter defining a transaction guideline or limitation associated with said remote communication unit;

- c) said interrogator positioned within a cabinet of said fuel dispenser.

8. The system of claim 7 wherein said predefined parameter defining a transaction guideline or limitation is stored in said memory in association with the interrogated remote communication unit and said control system is adapted to access said predefined parameters and control the transaction accordingly.

44

9. The system of claim 7 wherein the predefined parameter defining a transaction guideline or limitation is transmitted to the control system through said interrogator from said remote communication unit and said control system is adapted to receive the predefined parameters and control the transaction according to the predefined parameters.

10. The system of claim 7 wherein said control system includes a dispenser control system in a fuel dispenser including said customer transaction interface.

11. The system of claim 7 wherein said control system further includes a central site control system located apart from said fuel dispenser.

12. The system of claim 7 wherein said interrogator is integrated into a face of the fuel dispenser.

13. The system of claim 7 wherein said interrogator is secured to a front face of the fuel dispenser.

14. A system for providing a predefined parameter defining a transaction guideline or limitation in association with a customer's remote communication unit comprising:

- a) wireless communication electronics adapted to receive signals including indicia from a remote communication unit associated with the customer, said wireless communication electronics positioned above a fuel dispenser;
- b) a transaction interface for carryout of transactions initiated by the customer;
- c) a control system and memory associated with said communication electronics and said transaction interface; and
- e) said control system adapted to receive said indicia from said remote communication unit in response to an interrogation initiated by said control system and control a transaction at said transaction interface involving said remote communication unit according to the customer's predefined parameter defining a transaction guideline or limitation associated with said remote communication unit,

wherein said customer's predefined parameter defining a transaction guideline or limitation limits a transaction to a select type of fuel to be dispensed from the fuel dispenser.

* * * * *

EXHIBIT C



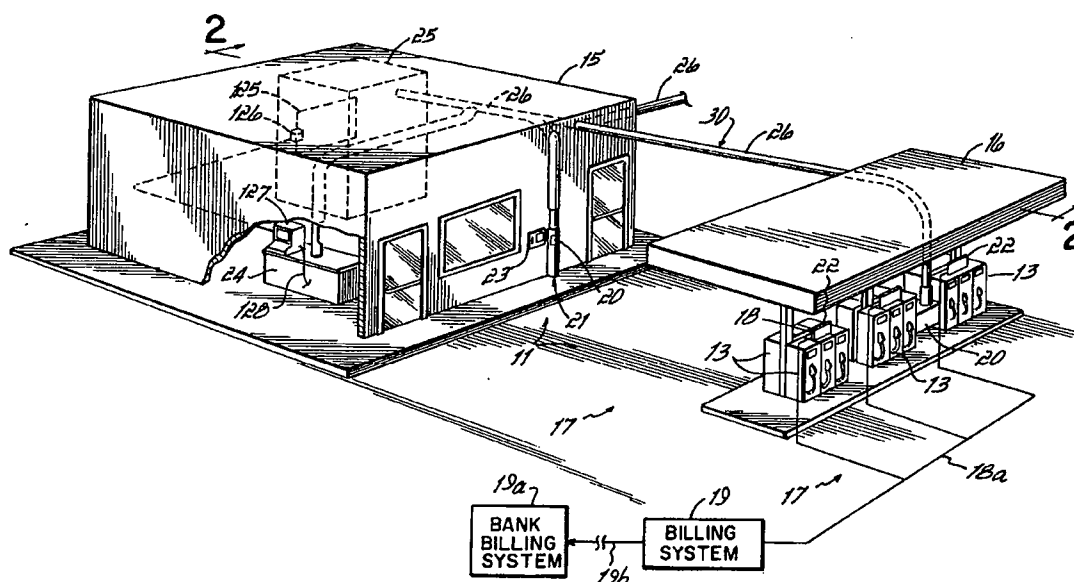
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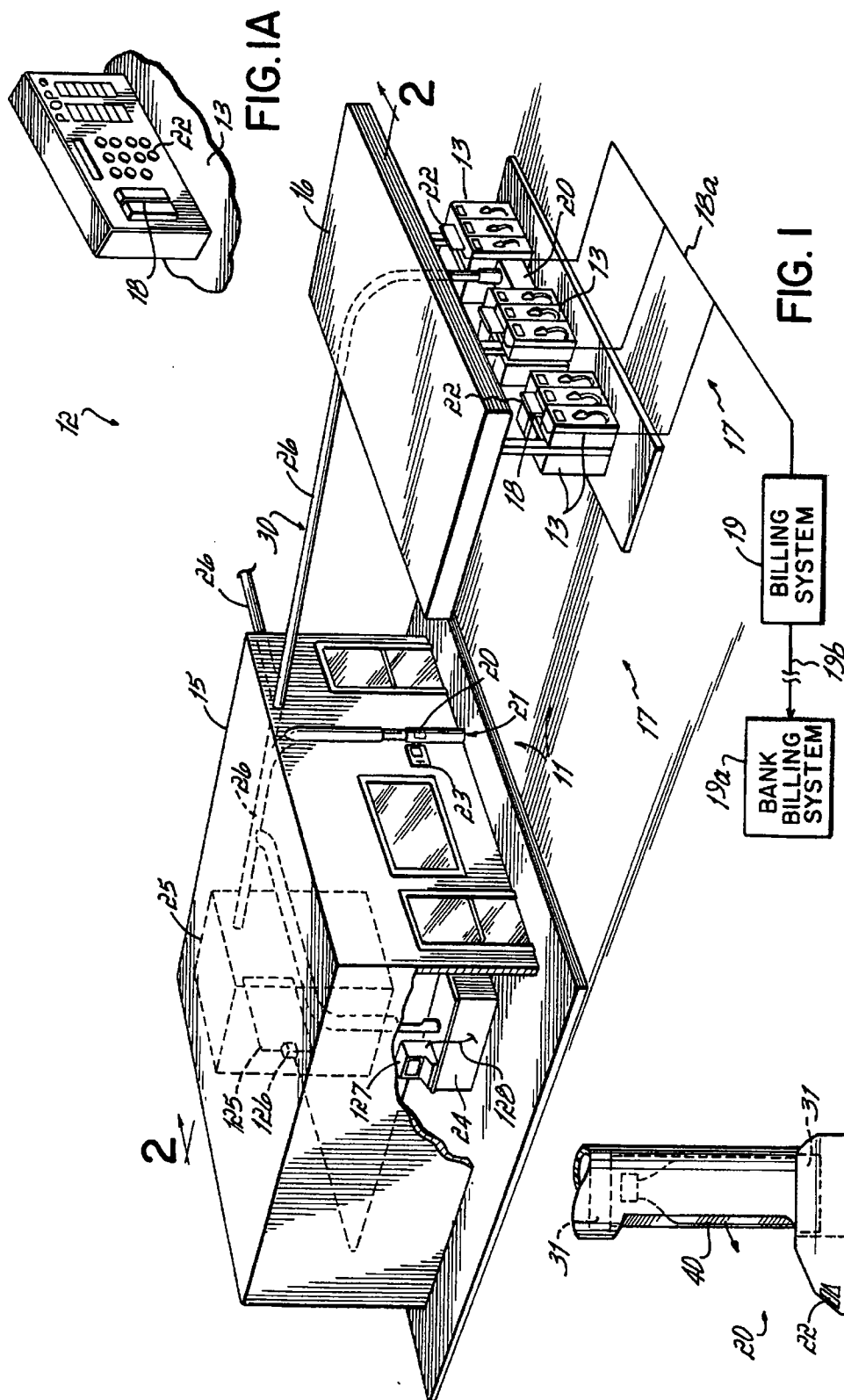
United States Patent [19][11] **Patent Number:** **5,816,443****Bustos**[45] **Date of Patent:** **Oct. 6, 1998**[54] **PRODUCT VENDING SYSTEM WITH
PNEUMATIC PRODUCT DELIVERY**2514442 10/1976 Germany .
56-3229 1/1981 Japan .
2202694 8/1990 Japan .[75] Inventor: **Rafael T. Bustos**, Alpharetta, Ga.[73] Assignee: **L&P Property Management
Company**, Chicago, Ill.*Primary Examiner*—Kenneth Noland
Attorney, Agent, or Firm—Wood, Herron & Evans, L.L.P.[21] Appl. No.: **571,252**[57] **ABSTRACT**[22] Filed: **Dec. 12, 1995****Related U.S. Application Data**[63] Continuation-in-part of Ser. No. 449,935, May 25, 1995,
Pat. No. 5,586,686, which is a continuation-in-part of Ser.
No. 404,243, Mar. 15, 1995, abandoned.[51] **Int. Cl.⁶** **B23Q 7/04**[52] **U.S. Cl.** **221/211; 186/55**[58] **Field of Search** **221/211, 278;**
186/55, 53, 52; 406/3, 1, 2[56] **References Cited****U.S. PATENT DOCUMENTS**

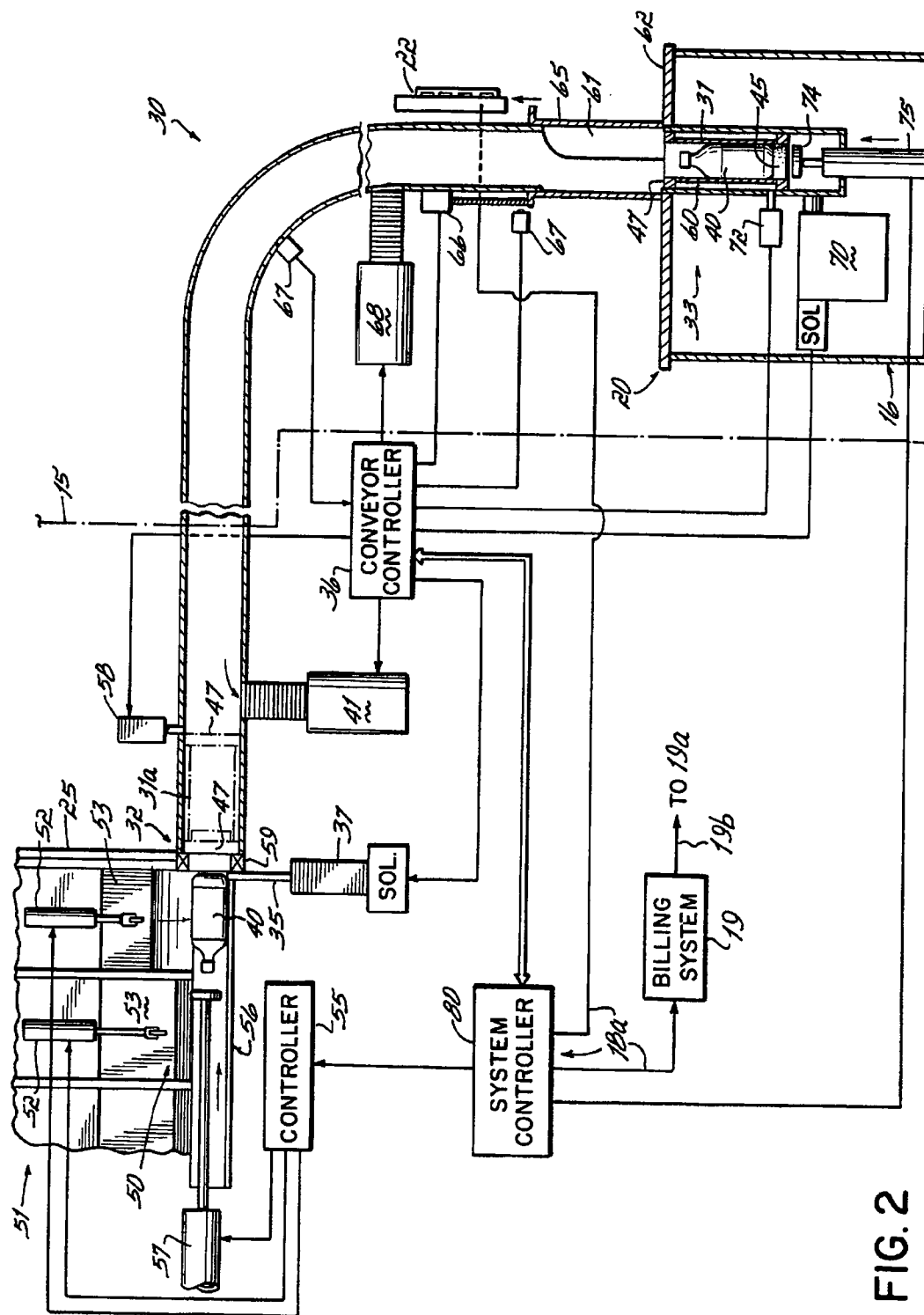
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35 Claims, 6 Drawing Sheets





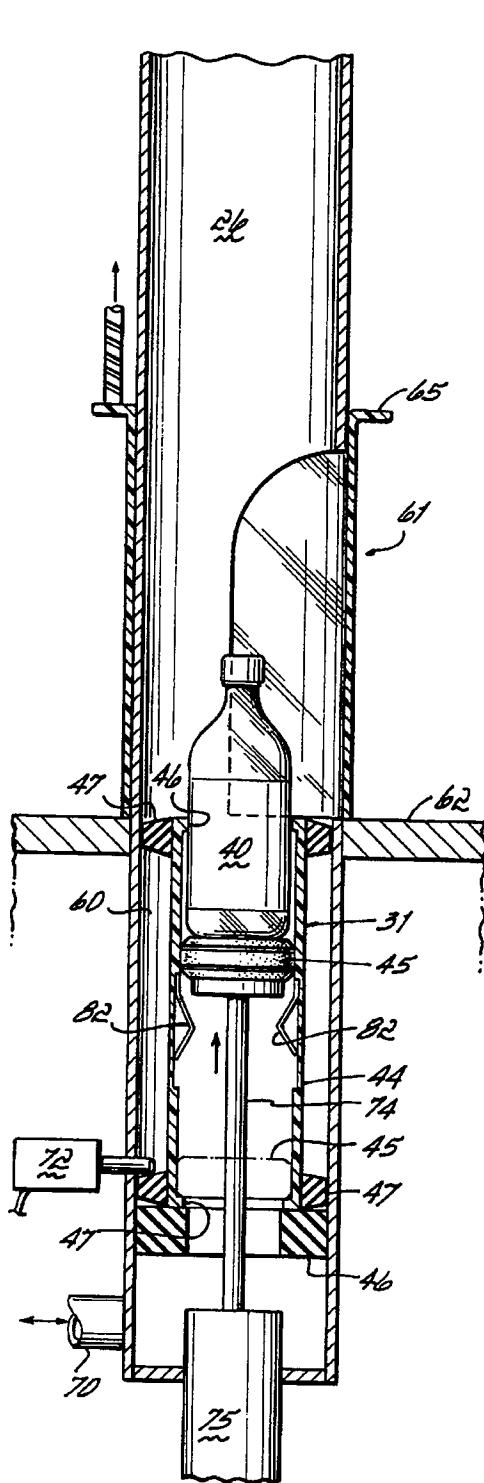


FIG. 3A

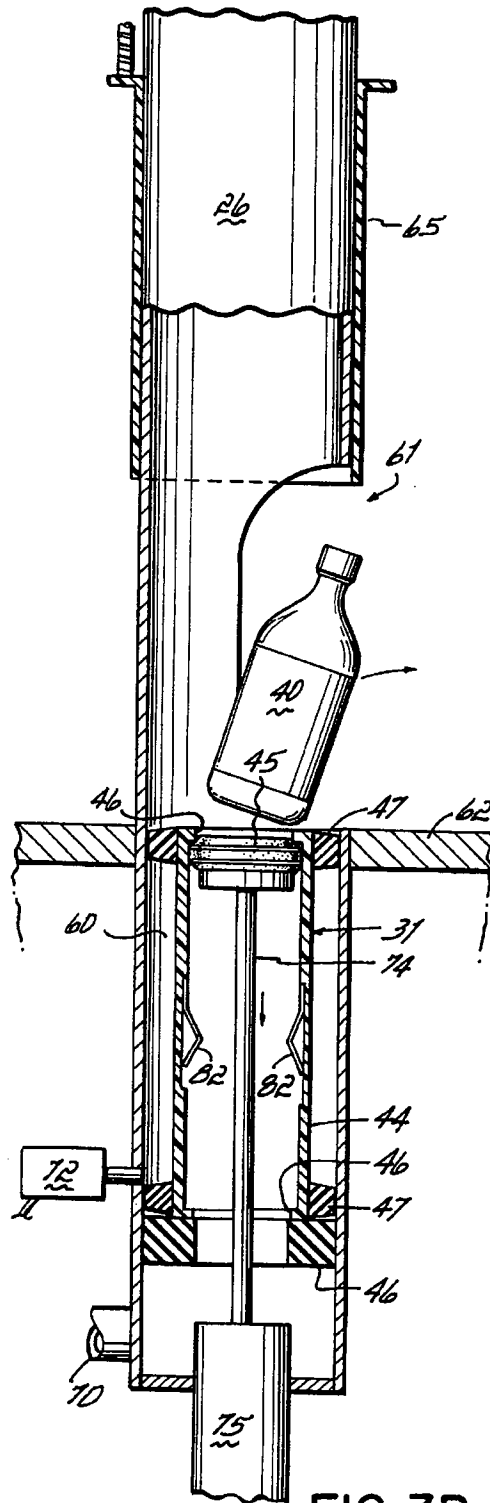


FIG. 3B

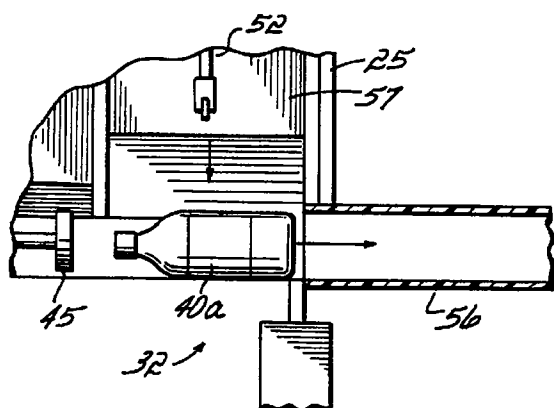


FIG. 4A

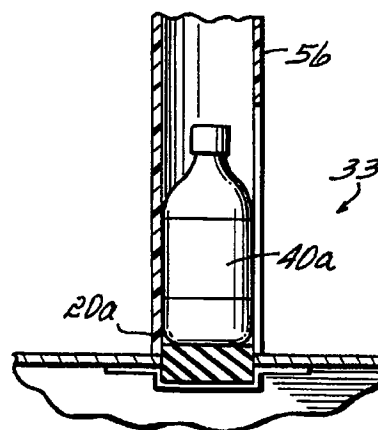


FIG. 4B



FIG. 5A

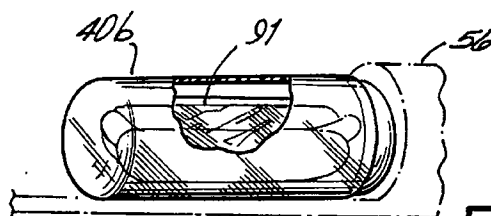


FIG. 4C

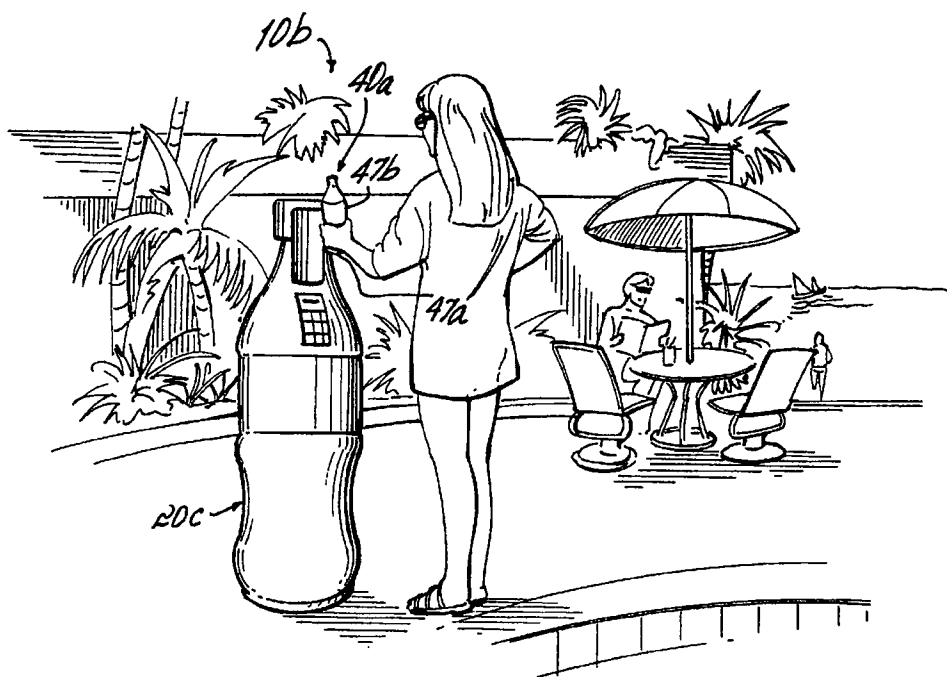


FIG. 5B

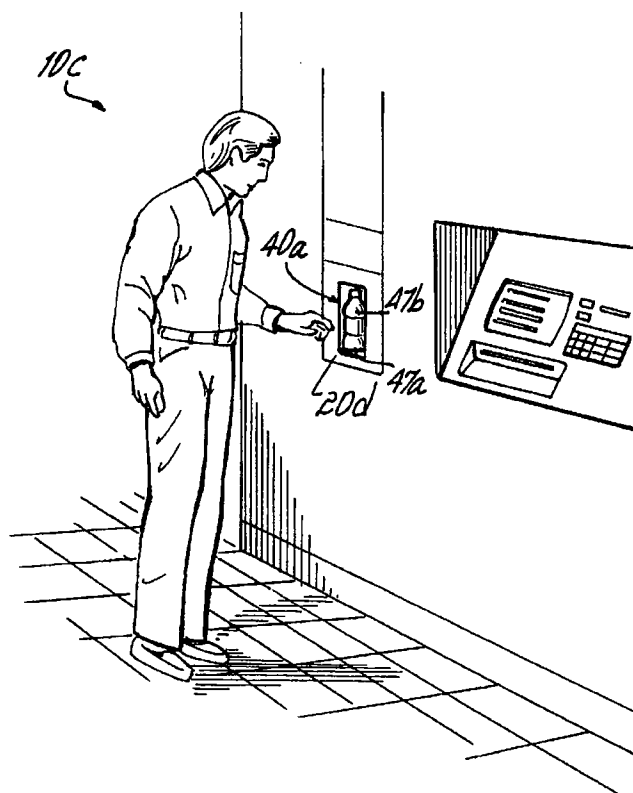
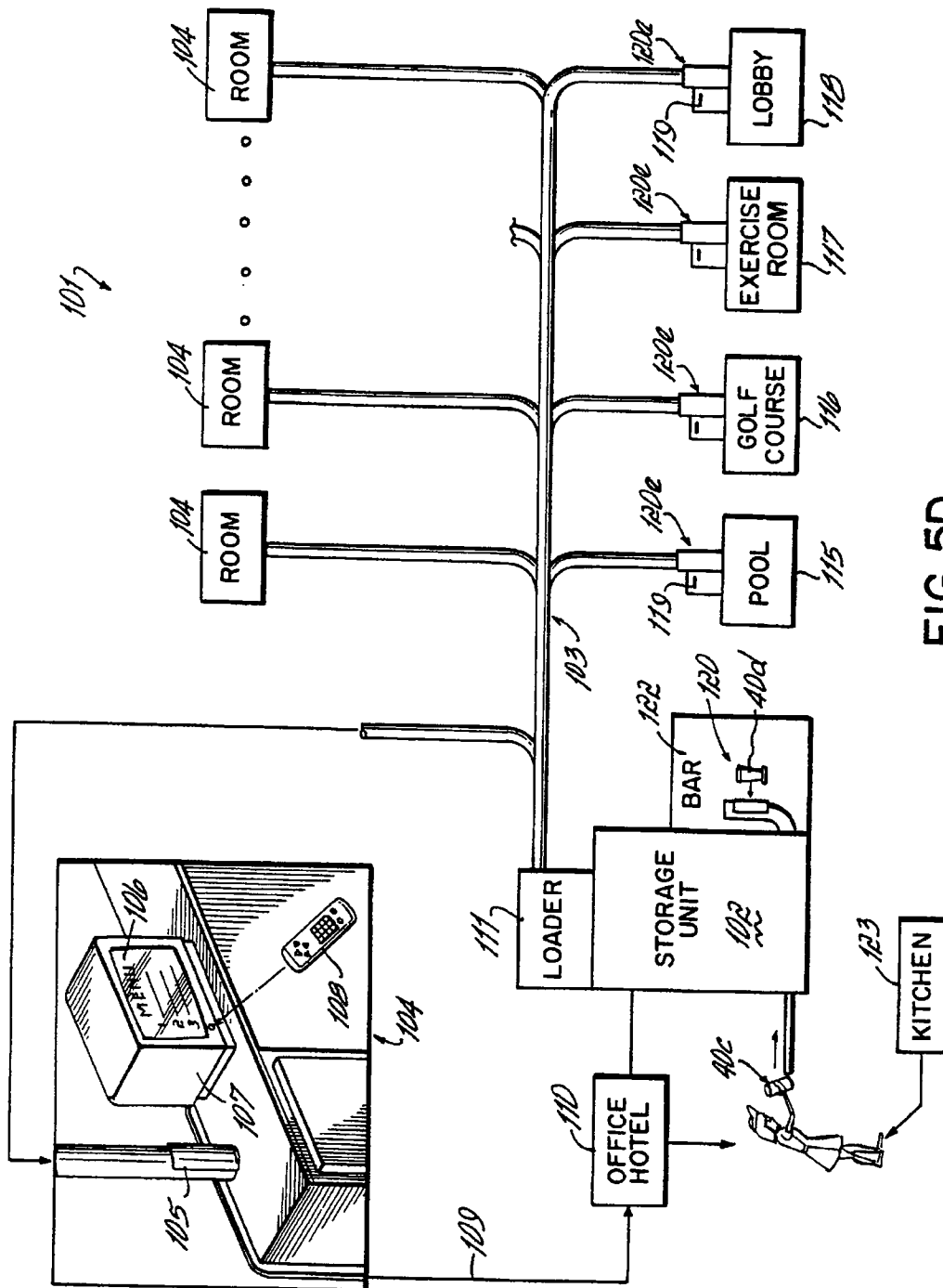


FIG. 5C



PRODUCT VENDING SYSTEM WITH PNEUMATIC PRODUCT DELIVERY

This is a continuation-in-part of U.S. patent application Ser. No. 08/449,935, filed May 25, 1995, now U.S. Pat. No. 5,586,686, entitled "Temperature Maintained Food Dispensing System and Method", which is a continuation-in-part of U.S. patent application Ser. No. 08/404,243, filed Mar. 15, 1995, now abandoned, entitled "Temperature Maintained Beverage Dispensing System And Method", both of which are hereby expressly incorporated by reference herein.

FIELD OF INVENTION

This invention relates to the vending, delivery and dispensing of individually packaged products such as beverages or other items of food, and, more particularly, to the delivery and dispensing of food and other vended products, and to the accounting for payment for such vended products.

BACKGROUND OF THE INVENTION

Much of the merchandising of food and beverages and the vending of a large number of other retail products occurs in circumstances that are ancillary to some other marketing activity by which other products and services are sold. That other activity is the primary attraction that brings the customer onto the business premises of the merchant or causes the customer to enter into a business relationship with the merchant. For example, hotel and travel accommodations, entertainment and sports events, recreational activities, and routine service activities such as tending to automobile fueling and service, personal grooming services and waiting for services or business appointments all may provide the primary reasons for people to enter onto certain business premises or to engage in a communication with a business enterprise. Such customers then purchase goods or services which result in charges or other forms of payment being made for such services or products.

On the occasions of the presence on such business premises, such people often have a demand for other products, such as food or beverage products, and become potential customers of the merchandising of such other products. The demands for such other products in such circumstances are not the result of any particular purchasing effort made by such customers to obtain such products, but are rather demands arising out of inherent needs ancillary to the occasions that attracted the people to the business premises. Accordingly, the success of the merchandising of products to such potential customers is largely based on the merchant having in place a system to take advantage of the opportunity to serve the customers' needs. The ability to provide the needed products to the customer with maximum convenience while avoiding extra effort and time commitments by the customer may be the key to the success of any additional sales activity by the merchant. On such occasions, the success in vending such ancillary products may be based more on the convenience and ease of the transaction to the customer than on the price. However, the practicality of providing such systems by the merchant may also be based on the convenience to the merchant in servicing such system without employing additional personnel or space consuming facilities to display or deliver the products or to register payment for the additional goods provided.

In prior art merchandising systems, the vending of food and other ancillary products to persons attending some event or being on business premises for some primary reason other than the purchase of such ancillary products has required a

generally labor intensive and space consuming enterprise that often requires substantially different skills and expertise than the main business being conducted on the site. Engaging in the vending of such products can add substantially to the overall business effort and cost of the business, which is often impractical and not worthwhile to the merchant. The activity of vending some unrelated products to a business's customers requires a commitment by the business, which, in many cases, deters the business from engaging in the vending opportunity.

Customers of many businesses have idle time during which they could purchase merchandise and would purchase merchandise but for the reason that there is no opportunity to do so. For example, when fueling an automobile at a self-service gasoline pump island of a gasoline service station, several minutes are spent waiting for the tank to fill. During this time, the purchase of a soft drink or other product could be made by the gasoline customer who cannot conveniently leave the pump location while the vehicle is being fueled to enter the service building or to approach a vending machine. Such a gasoline customer may be provided with a card reader at the pump, which accepts a charge card account as payment for the fuel without the need to enter the station. Such a customer may therefore forego the expenditure of the additional time required to leave the fueled vehicle at the pump to purchase food, a beverage, or another marginally necessary product. Other customers spend time waiting for professional services, for service to be performed on vehicles, for appointments in barbershops and beauty salons, in ticket and admission lines and at a variety of other business locations. During this idle time, the opportunities to vend products to these customers is lost due to the difficulty and cost of providing or adapting a merchandising system to the occasions.

Difficulty in merchandising products to customers is due in part to the need to protectively store products for sale, particularly where the product is a beverage or other food product. For example, the retail sale of beverages for immediate consumption is typically carried out in one of two ways: either by over-the-counter sale by a server or attendant at a store or other indoor location or by mechanized unattended sale from a drink dispensing machine, which may be at an indoor or an outdoor location. Beverages that are to be sold for immediate consumption are usually stored at a refrigerated temperature that is several degrees above the freezing point of water. The refrigeration is most commonly achieved by cooling a storage enclosure within the store building that is otherwise maintained at a typical room temperature. In addition, in geographic locations where temperatures drop below freezing, some heating of the building that surrounds the beverage storage enclosure maintains the building at the room temperature. With outdoor dispensing machines, such machines are usually not employed at times where below freezing temperatures are expected.

Systems have been provided for the marketing of beverages such as juices and soft drinks at locations more convenient to consumers. Such locations have included many that are frequented by vehicular or pedestrian traffic, such as gas stations and entertainment facilities. These locations have included concession counters and convenience stores that have been integrated with the gas station or entertainment facility.

Outdoor retail locations such as the vehicle service islands of gas stations are increasingly being provided with payment devices such as credit card readers that are operatively connected with the vehicle service devices, such as the

gasoline dispensing pumps, for use by a customer purchasing gasoline, for example, to pay for the purchase without leaving the vicinity of the vehicle. At such locations, the customer is, nonetheless, required to enter the adjacent store facility to purchase snacks or beverages. The logistics of purchasing such additional products subjects the customer to an additional inconvenience, requiring some additional time and effort, which, in a certain percentage of cases, the consumer elects to forego, resulting in a loss to the retailer of a potential sale. Furthermore, the use of card readers at self-service gasoline pumps provides the capability for completely unattended gasoline sales, with the customer delivering the purchased gasoline from the self-service pump and making automatic payment without the intervention of a service attendant. Such a capability makes possible the sale of gasoline at night or at other times when no attendant is on duty, since there is no cash that must be handled and no requirement for the added security incident to a facility at which cash will be accepted and stored. At such unattended facilities, conventional systems for providing additional products such as beverages to the gasoline customer are not readily adaptable.

The vending of sandwiches and other solid food products for immediate consumption in the facilities discussed above present similar problems. Such products must usually be contained in their individual packaging, must be protected from environmental conditions such as excess heat or cold, and are preferably cooled or heated prior to or upon vending so as to require a freezer or a heating device such as a broiler or microwave oven that is preferable not to maintain at the vending area. With carry-out and drive-through fast food facilities, prepared heated or cooled foods are selected by customers from limited lists, packaged, paid for, and delivered into the hands of the customer in a manual labor intensive operation, presenting similar problems.

Accordingly, there is a need in the retailing industry, particularly for the sale of cool beverages, or temperature maintained, cooled or heated food items at locations such as gas stations, for delivering and dispensing such products to the consumer at a location of maximum convenience.

SUMMARY OF THE INVENTION

A primary objective of the present invention is to provide a method and system for merchandising products to customers in situations and at locations where it has previously been inconvenient or expensive to do so. It is a particular objective of the present invention to vend food and other products to customers at locations at which it may be impractical to store the products and to do so in a way that minimizes the amount of human labor required to sell and deliver the products to the customer.

It is one particular objective of the present invention to provide a vending system with the ability to automatically deliver and dispense or otherwise present products to customers at locations remote from the product storage area and to allow the customer the ability to select products and order their purchases without the intervention or assistance of a sales or product delivery person. It is a more particular objective of the present invention to provide such a system in which products can be stored at a convenient storage location and automatically dispensed to a customer at a location sufficiently remote from the storage location to separate the supply from the vending site and to accommodate a pedestrian, article or vehicle passage or a structure, device or partition therebetween.

It is another particular objective of the present invention to provide a vending system with the ability to automatically

convey products in their own packages to customers without the need for the product to be carried to the customer by a delivery person or by the movement of a reusable mechanical carrier as part of the delivery system. A further objective of the present invention is to provide a system and method for delivering purchased products to customers, and particularly for delivering and dispensing temperature maintained beverages or other food products in their own non-reusable individual packages or packaging containers to consumers at non-temperature controlled locations that are of greater convenience to the customers than would be the temperature controlled locations at which the products are stored.

It is a further objective of the present invention to provide a potentially unattended system and method for delivering a temperature maintained beverage or other product to a consumer at a non-temperature controlled location, particularly by maintaining the product at a location that is remote from the dispensing location and is secure. It is a further objective of the present invention to provide such a system and method by which completely unattended consumer sales of products such as beverages and other food products for immediate consumption may be carried out.

Another objective of the present invention is to provide an auxiliary product vending system that supplements a diverse product or service providing system, particularly a diverse system that includes or is associated with a payment receiving or charging subsystem, and which can service the customers of such a diverse system and use the payment subsystem of the diverse system to account for payment for the products sold through the auxiliary product vending system.

According to the principles of the present invention, a method and system are provided by which individually packaged products, including beverages, such as soft drinks, solid food items such as sandwiches and ice cream, and other consumable convenience products, are maintained, preferably in a temperature controlled environment if beneficial, at a storage location that is remote from a point of sale to a consumer desiring such product for immediate consumption. With the preferred embodiment of the invention, the product is ordered and may also be paid for by the consumer at the point of sale adjacent a service counter, an outdoor access lane, which may be at a drive-up location such as at a vehicle accessible gasoline pump island at a gasoline service station, or at some other goods and services vending area, such as a general store counter, a ticket counter, an exercise machine, or other such location. The ordered product is delivered, in response to the order, from the storage location by way of a pneumatic tube.

In accordance with one preferred embodiment of the invention, a mechanism is provided that selects a product in response to the entry of a selection command by the consumer at the point of sale, and feeds the product in its packaging container, either by loading the packaging container into an adequately insulated and padded capsule or carrier, for delivery through the pneumatic tube, or preferably by loading the packaging container directly into the pneumatic tube, with the container appropriately configured to fit in and through the tube. A pneumatic tube conveyor system delivers the product to the point of sale at which the product may be carefully decelerated and automatically removed from the capsule, or presented only in its packaging container, to the consumer. More than one customer terminal may be provided in a single system, in which case any of a number of conventional techniques may be used to route the product to the customer terminal from which the order originated, and to charge the price of the product to the appropriate customer.

5

In certain preferred forms of the invention, the system of the present invention is provided in the form of a supplemental or auxiliary product vending system by which advantage is taken of the access to the customers of a diverse product vending or service providing system. Preferably, advantage is also taken of the components of the diverse system or the subsystems with which it is associated, particularly of the payment accounting subsystem of the diverse system. For example, accounting for payment for an order placed by a customer in the auxiliary system may be carried out by way of coded information identifying the user account and entered at the point of sale, such as by charging or otherwise posting the payment to an account of the customer. In a gasoline vending system, for example, the vending of automobile maintenance items, food or other products may be made to gasoline system customers and with the charge therefor made to a gasoline charge account that is identified by reading a gasoline credit card of the user in connection with the purchase of gasoline or other such product.

Further, in other diverse systems, a charge may be made to the membership account of a user or customer of the system for products purchased through an auxiliary system according to the present invention by accepting and reading a membership card, key card or user entered personal identification number or code, at a membership facility such as a recreational or social club, athletic or other such facility. In addition, in a diverse system such as a hotel, a hotel guest may select items from a menu via the room television set and have purchases of products delivered by tube to the room and charged to a guest room. Such a guest may also purchase items outside of the hotel room on the hotel premises, by inserting a room key or key card and ordering a product by way of the video or other automated equipment. Thus, a hotel guest may purchase, for example, a beverage, a snack or a personal article in a hotel hall or lobby, at pool side or in an exercise room. The hotel may use such a system to replace much of the room service and the provision and stocking of a hotel room minibar. Similarly, in restaurants, airports, supermarkets, and other facilities where a patron thereof is identified personally or through an account such that the patrons funds will be applied or charged for the products or services provided by the diverse system, auxiliary systems according to the present invention may utilize the charging or payment receiving capacity of the diverse system.

Features of the present invention are also useful in food vending systems such as hotel room-service systems, remote bar service and fast food carry-out and drive-through facilities and to provide refreshments in stadiums, arenas and theaters. In such facilities or systems, automated order accepting terminals located remote from a bar or kitchen may communicate an order to a central location at which prepared food items, may be either prepackaged or manually prepared and placed in special carrier shaped non-reusable containers. The containers may form the packaging container for the food product or may surround such a packaging container, and thus form a disposable carrier for the packaging container. The non-reusable container is then loaded, either manually or automatically, into the tube of a pneumatic conveyor to be pneumatically transferred to a dispensing terminal at the remote terminal. Such terminals may be provided with automated payment devices, or preferably, with card readers or other customer or customer account identifying devices. Such devices may further be coupled with a diverse product or service vending system.

In certain embodiments of the invention, the pneumatic tube transports the product from a storage location to one or

6

more terminals that are remote from the storage location, particularly across a pedestrian or vehicle lane or way, or past a product conveyor or other transport lane or other object that prevents placing the product storage at the point of sale or delivery of the product to the customer, or through a wall or floor or past another object that separates the customer from the storage area.

Further in accordance with certain embodiments of the present invention, there is provision for automation of the product storage restocking process. The product storage is preferably made accessible to the product supplier or distributor, for example, by providing a beverage storage unit at a gasoline service station accessible from outside of the building through a locked door to which a product supplier's delivery person has a key. Such storage unit can be restocked at any time, not only when the gasoline station attendant is on duty. Communication with the product distributor is made automatically by the system, which keeps track of inventory and automatically signals the distributor or supplier when stocks are low.

The advantages of the present invention include that of convenience to the consumer. In addition, the method and system of the present invention facilitate the sale of beverages and other such consumable products where sales might not otherwise take place. Such sales may also take place without an attendant being on duty to provide the product or to collect the payment for the product, because the credit charging capacity of the gas dispensing or other such operation can be utilized. Further, such product sales will command a higher price due to the additional convenience that is provided. As a result, the profitability of operating a retail facility such as a gas station is likely to be increased. With the system of the present invention, the products dispensed are protected from heat and cold, and the exchange of cash in connection with such a product's sale is avoided, thus eliminating one element of the problem of the security of the facility.

These and other objectives and advantages of the present invention will be more readily apparent from the following detailed description of the drawings of the preferred embodiment of the invention, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of one preferred embodiment of a system according to principles of the present invention.

FIG. 1A is a schematic perspective view of a card reader of the system in one alternative embodiment to that of FIG. 1.

FIG. 1B is a schematic perspective view of an alternative dispensing unit of the system of FIG. 1.

FIG. 2 is a cross-sectional view of the system of FIG. 1 along the line 2—2 of FIG. 1, illustrating, in one portion thereof, a carrier or capsule being loaded with product and, in another portion thereof, a capsule that has been delivered to the point of sale.

FIG. 3A is a cross-sectional view illustrating a portion of FIG. 2 with the capsule in an intermediate stage of being unloaded of product.

FIG. 3B is a cross-sectional view similar to FIG. 3A with the capsule in a final stage of being unloaded of product.

FIGS. 4A is a sectional view of a portion of FIG. 2 illustrating the loading of a beverage in its packaging container into a pneumatic tube so that the packaging container forms the carrier.

FIGS. 4B is a sectional view of a portion of FIG. 2 illustrating the delivery of the beverage of FIG. 4A in its container.

7

FIG. 4C is an isometric view of a food item in its packaging container for delivery through the pneumatic tube of the system of FIG. 1.

FIG. 5A is a perspective view of an alternative embodiment of the system of FIG. 1.

FIG. 5B is a perspective view of another alternative embodiment of the system of FIG. 1.

FIG. 5C is a perspective view of another alternative embodiment of the system of FIG. 1.

FIG. 5D is a diagrammatic illustration of an alternative embodiment of a system according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates one preferred embodiment of the invention in the form of an automated retail system 10 that includes a product vending system in the form of an automated food or beverage delivery and dispensing system 11 in combination with a diverse product providing system in the form of a self-service gasoline dispensing facility 12. The gasoline dispensing system 12 of the combination 10 typically includes a building 15 that may be an attended retail store with one or more remote outdoor gasoline pumps 13 located at one or more remote outdoor islands 16 that are accessible to the customers of the gasoline facility 11. Adjacent the store building 15 and the island 16 are provided one or more vehicle lanes 17 that render the building 15 and the pump island 16 directly accessible to the vehicles of customers. In all but ideal climates, the building 15 is usually provided with climate control such as heating and air-conditioning, while the pump island, being outdoors, is at the ambient temperature dictated by the climate.

Pump islands 16 are increasingly being provided, even in the prior art systems, with card readers 18 that are electrically interconnected with an accounting, payment or billing system 19 of the facility 12, which is typically in communication with an on-line credit card verification or banking operation 19a, often by way of telephone lines, 19b. With such billing systems, gasoline customers of the facility 12 are able to purchase gasoline without the assistance of an attendant, either to pump the gasoline or to collect the payment therefor, and can do so without leaving the vicinity of their vehicles in the lanes 17. Such billing systems 19 are provided with logic that combines information from the gas pumps 13 relating to the amount and type of gasoline purchased with account information relating to the customer from the card reader 18. The billing system 19, in one form, is an on-line terminal of a large computer at a central bank or oil company credit card account system or a combination of a cash register and such a terminal. In another form, the system 19 includes a programmed computer at the facility 12, which may process all charges on the site or be combined with the terminal form of system and shares functions with the computer at the central accounting system.

With the present invention, the addition of the product dispensing and delivery system 11 as an auxiliary system to a diverse product or service providing system, such as the self-service gasoline vending facility 12, provides the capability for the gasoline customer of the facility 12 to also purchase beverages and other products with the same convenience as is possible for the purchase of gasoline, and at the same time. This is provided by including in the system 11 one or more customer accessible product delivery terminals that include product presenting or dispensing units, such as beverage dispensing units 20, adjacent the gas pumps 13 at each of a plurality of the gasoline pump islands 16 or at another outdoor location 21 adjacent the traffic lanes

8

17. The dispensing units 20 of the customer terminals are preferably each adjacent to or included in the credit card reader 18, and provided with an order entry panel 22 by which the customer may add to his gasoline purchase the selection and purchase of a beverage, as illustrated in FIG. 1A. The panels 22 preferably include one or more selectors, such as push buttons (not shown) for selecting the product to be purchased.

The units 20 are preferably connected to some device, circuitry or other transmission or communication link 18a that is in communication with the card reader 18 or the billing system 19 of the gasoline vending system 12 so that information of the purchase and price of the product is communicated to a payment system such as the gasoline credit card account of the customer. A separate card reader 23, customer identifier or payment device may be provided at any of the dispensing units 20, for example, at a location 21 that is distant from the reader 18 at the pump island 16. Such dispensing units 20 preferably include a panel 22, so that the consumer may order such a beverage, as illustrated in FIG. 1. Also, a dispensing unit 20 may be provided at an attended counter or indoor room temperature location 24, and tied into a payment device, which may be in the form of a credit card reader, a personal identification number entry device, or a cash register payment receiving or charge system within the building 15, which is set to process a transaction of the customer of the vending system 11.

In its preferred form, the payment device by which the price of the product being vended is charged to a particular customer is in the form of a communication device or circuit that is tied into a diverse system through which a customer has initiated a transaction, having entered the information necessary to charge the customer with the price of the product or to include the price in the product in the amount of the pending transaction. Thus, by situating the payment device at a gasoline pump at which credit card information is entered to activate a gasoline dispensing transaction, the customer, who generally occupies the space adjacent the order entry device 22 on which an order for the product is made, can merely enter a purchase selection on the panel 22, without further entry of customer identifying or account information. Similarly, by situating the customer terminal adjacent a checkout lane of a supermarket, convenience store or other retail facility so that only a customer in the process of engaging in a retail transaction has access to the panel 22, a product order can be processed from a selection on the panel 22, charging the price directly to the pending transaction being processed at the checkout lane cash register.

In the illustrated embodiment of FIG. 1, the beverage vending system 11 is further provided with a temperature controlled storage vault 25 that is preferably enclosed within the store facility 15 and is generally refrigerated or preferably enclosed within the store facility 15 and is generally refrigerated or otherwise temperature maintained at approximately 5° C. The vault 25 is interconnected with each of the dispensing units 20 by one of the pneumatic tubes 26 of a pneumatic delivery system 30 of a type more particularly illustrated in FIG. 2.

Referring to FIG. 2, the pneumatic delivery system 30 includes the tube 26 of generally circular cross-section, which extends from the vault or beverage storage unit 25 within the store building 15, and the beverage dispensing unit 20 at the gas pump island 16. According to one embodiment of the invention, within the tube 26 is contained a carrier 31, which, during normal operation of the pneumatic delivery system 30, is not removable from the tube 26,

although the carrier 31 may be removed from the tube 26 by way of a service door (not shown) in the tube 26 at one or more locations along the tube 26. The tube 26 has a single loading end 32 at the vault 25 and a single discharge end 33 at the dispensing unit 20, with only one carrier 31 per tube 26, although more than one such tube 26 may be provided to connect the vault 25 with more than one dispensing unit 20 at different outdoor or other locations.

The storage unit 25 may be provided with a reloading access door 125 that is accessible from outside of the building 15 to permit restocking by the product distributor without involvement of the operators of the gas station facility 12. Such a storage unit 25 is preferably provided with sensors 126 that may be linked to the inputs of a computer 127 that is programmed to automatically evaluate the stock in the unit 25 and communicate over phone lines 128 with the product distributor, advising that the storage unit 25 at the particular facility 12 is in need of being restocked.

At the loading end 32 of the tube 26, a pneumatically or electrically operable gate 35 is provided, which is operated in response to a signal from a pneumatic delivery system or conveyor controller 36 to a gate actuator unit 37. The gate 35 is moveable between an open position at which a filled beverage container 40 may be loaded from the vault 25 into the carrier 31 and a closed position that will allow a vacuum to be drawn between the gate 35 and the carrier 31 to move an empty carrier 31 from the dispensing unit 20 toward the vault 25. Such a vacuum is applied by a high volume pump 41 being operated at a vacuum. The actuator unit 37 may also be provided with valving, a pump or other devices to vent or otherwise control the pressure within the tube 26 immediately inside of the gate 35 to insure the desired motion of the carrier 31 in the portion of the tube between the gate 35 and the pump 41.

The configuration of the carrier 31, which is illustrated in more detail in FIGS. 3A and 3B, may be formed of a cylindrical tubular body 44 formed of metal or hard plastic, which is open at both ends. The inside surface of the body 44 is formed of a padded and thermally insulative material 43. Within the body 44 is slidably mounted a circular plunger 45. The inner surface of the insulative material 43 is formed of a material that is adapted to permit the plunger 45 to slide fairly freely but to form at least a moderate air seal with the body 44. The plunger 45 is contained within the body by circular stops 46 formed in the opposite ends of the body 44. The plunger 45 slides sufficiently freely in the body 44 so as to be drawn to the low pressure side of the carrier 31 and thus locate itself at the leading end of the carrier 31 as the carrier 31 is being pneumatically forced through the tube 26. At the ends of the body 44, around the outside of the stops 46, is provided a pair of annular bumpers 47, preferably of a moderately hard rubber or similarly elastic synthetic material. The bumpers 47 support the carrier 31 in a low friction slidable contact with the wall of the tube 26 and hold the body 44 in spaced relationship to the wall of the tube 26 to facilitate the movement of the carrier 31 around curves and bends in the tube 26. The plunger 45 provides both a seal to facilitate movement of the carrier 31 in the tube 26 and a support for the bottom of the container 40 in the carrier 31. The inside surface of the body 44 provides a small amount of friction force to hold a container 40 therein while the carrier 31 is moving, but not so much friction as to interfere with the loading of the container 40 into the carrier 31. In addition or in the alternative, other elements may be provided to hold the product container 40 in the carrier 31, such as pins or, as illustrated in FIGS. 3A and 3B, for example, by spring clips 82.

Referring again to FIG. 2, within the vault 25 is provided a conveyor loading mechanism 50 for feeding beverage containers 40 of any selected one of a number of types from a supply 51 to the input end 32 of the tube 26. Any one of a number of retrieving and feeding devices may be provided as the mechanism 50 to drop or robotically retrieve and place the selected container 50 into the open end 32 of the tube 26. In FIG. 2, a drop-shoot vending machine type of dispensing unit is illustrated as the mechanism 50 for simplicity, in which actuators 52 open a door 53 at the bottom of the supply 51 to individually drop one beverage container 40, in accordance with a signal from a loading mechanism controller 55, onto a loading trough 56, with the bottom of the container 40 facing the open end 32 of the tube 26. In this position, a loading ram 57 pushes the container 40 into the carrier 31, also in response to a signal from the controller 55.

To be loaded with a container of beverage 40, the carrier 31 must be secured in the position illustrated by the phantom lines 31a in FIG. 2. In this position, one of the bumpers 47 will rest against a fixed bumper or stop 59 surrounding the opening at the open end 32 of the tube 26, and are of smaller diameter than the tube 26 or the bumpers 47 of the carrier 31 to trap the carrier 31 in the tube 26. In this position, a solenoid actuated locking member 56, which is activated by a signal from the conveyor controller 36, holds the carrier 31 immobile while the container 40 is being loaded into the carrier 31. During loading, of course the gate 35 is open. Also during loading, the plunger 45 may be in any position initially, but it will be forced to the end of the carrier 31 that is farthest from the end 32 of the tube 26 by the pushing of the container 40 by the ram 57. The carrier 31, with the slidable plunger is symmetrical and, with some tube configurations, can be used in either direction and loaded with containers 40 from either side.

The tube 26 usually extends horizontally from the vault 25 but may rise or fall somewhat on the way to the location of the dispensing unit 20. Approaching the dispensing unit 20, the tube 26, in the preferred embodiment, changes to a vertical orientation to enter the dispensing unit 20 from the bottom or, as shown in the illustrated embodiment, from the top. The discharge end of the tube 26 at the dispensing unit 20 is preferably closed and contains a carrier holding space 60, approximately as long as the carrier 31, that spaces the closed end 33 of the tube 26 from a delivery window 61 in the side of the tube 26. A horizontal surface 62 in the form of a counter top covers the dispensing unit 20 and aligns with the boundary between the top of the holding space 60 and the delivery window 61. The delivery window 61 faces the customer, for example, toward the window of a vehicle 64 on the access way 17, and is provided with a door or cover 65 that, when in a closed position, pneumatically seals the window 61, as in FIG. 3A, and when in an open position allows a container 40 to be removed from the tube 26, as in FIG. 3B. The door or cover 65 may be configured to open and close by vertical movement on the tube 26, or by rotational movement around the tube 26, or by hinged motion or otherwise. Preferably, the opening and closing of the door is achieved by the actuation of a door operating motor 66 in response to a signal from the conveyor controller 36. The door 65 may be made of a transparent plastic material, which is particularly desirable if manual opening of the door 65 or manual activation of the door opening actuator 66 is desired.

In the vertical portion of the tube 26, either near the end 33 of the tube 26 or, preferably, just above the delivery window 61, is an additional high volume pump 68, which is also controlled by signals from the conveyor controller 36.

The pump 68 operates in cooperation with the pump 41 to move the carrier 31 back and forth between the vault 25 and the dispensing unit 20. This pump 68 may be a vacuum pump or may also be capable of operation at positive pressure. When a carrier 31 is being moved from the vault 25 toward the dispensing unit 20, the pump 68 will operate at a vacuum, at least until the carrier 31 is in a position and moving at a speed sufficient to insure that it will continue to drop by gravity toward the dispensing unit 20. The position and speed of the carrier 31 may be verified by the provision of one or more sensors, such as, for example, optical sensor 67 in the wall of the tube 26. When the carrier 31 has reached the point of the sensor 67, for example, the pump 68 and/or a pressure control unit 70, which may include one or more valves, vents to atmosphere or pumps, will be operated to insure that some pressure is provided in a sealed space in the tube 26 below the arriving carrier 31 to cushion the arrival of the carrier 31 at the dispensing unit 20, and to bring it to rest gently in the space 60 adjacent the end 33 of the tube 26.

When a carrier 31 has arrived at the space 60 containing a beverage container 40, a locking solenoid 72 is actuated in response to a signal from the conveyor controller 36 to lock the carrier 31 in position in the tube 26 so that the beverage container 40 therein can be unloaded. The unloading of the beverage container 40 is accomplished by the movement of a piston 74 of an unloading cylinder 75 that is actuated, also in response to a signal from the conveyor controller 36, as is better illustrated in FIGS. 3A and 3B. As illustrated in FIG. 3A, the actuation of the cylinder 75 extends the piston 74 upwardly into contact with the underside of the plunger 45. With the locking solenoid 72 holding the carrier 31 against movement in the space 60, the plunger 45 slides upwardly in the carrier 31, lifting the container 40 upwardly into alignment with the window 61 above the counter surface 62. When the container 40 is adjacent the window 61 with the plunger 45 aligned with the countertop 62, the door opening mechanism 66 is actuated to open the door 65 so that the container 40 can be removed by the customer, as illustrated in FIG. 3B.

An alternative structure for the pneumatic delivery system 30 may provide for the carrier 31 to have a door or opening in the tubular body 44 for the removal of the contents by the customer, as the carrier 31 presents the product at the dispensing unit 20, as illustrated in FIG. 1B. Pneumatic delivery systems that include additional details of systems such as system 30 are well known and may be utilized with the system 30 described herein.

The operation of the conveyor controller 36 and the loading mechanism controller 55 are coordinated and controlled in response to orders placed by customers on the panel 22 and in response to payments made by way of entry of charge account information into the card reader 18, through a beverage delivery system or main controller 80. For example, when a gasoline customer purchases gasoline and inserts a charge card in the card reader 18, a message is displayed asking if an additional purchase of a beverage is desired. If so, an order may be placed by selecting the brand and type of beverage desired by pressing a button on the panel 22. This button selection transmits the beverage order to the main controller 80 which preferably controls the conveyor controller 36 and loading mechanism controller 55 to cause delivery of the product to the customer. The controller 80 is also part of the communication circuitry 18a that causes the price of the order to be added to the gasoline charge made through the billing system 19 (FIG. 1) to the account identified by the card read by the card reader 18. If the carrier 31 is in the position 31a indicated by the phantom

lines near the loading end 32 of the tube 26 in FIG. 2, the gate 35 is opened, the loading mechanism controller 55 is signaled by the controller 80, which causes the controller 55 to activate the appropriate actuator 52 to open the door 53 to drop the selected beverage in its container 40 into the trough 56. Thereupon, the controller 55 energizes the cylinder 57 to push the dropped container 40 from the trough 56 into the carrier 40. When the controller 80 determines that the container 40 has been loaded into the carrier 31, through feedback signals from the controller 55 or through additional sensors (not shown) that may be provided, the conveyor controller 36 is signaled to initiate the transporting of the loaded carrier 31 to the dispensing station 20.

The transporting of the carrier 31 to the dispensing station or unit 20 begins with the assurance that the door 65 that covers the window 61 is closed and that the pressure control unit 70 is set to insure that the lower end of the tube 26 is sealed. Then the pump 68 is energized. The gate 35 will remain open at this time or there will be other openings to allow a venting of atmosphere to the vault side of the carrier 31. This will cause the carrier to be drawn through the tube 26 toward the pump 68. When the carrier 31 has reached the vicinity of the sensor 67 and is moving sufficiently to cause it to reach the vertical section of the tube 26, the pump 68 is turned off, allowing the carrier 31 to free fall. However, in that the lower portion of the tube 26 is sealed, pressure in the tube 26 below the carrier 31 will inhibit the fall of the carrier 31. Either by providing for appropriate sealing in the lower end of the tube 26 to allow for a controlled escape of air from the tube 26, or by operating the pressure control unit 70, which is optional, pressure can be maintained in the lower portion of the tube 26 that allows the carrier to be gently lowered to the space 60 at the lower end of the tube 26 so as to rest on a stop 81 provided there, at which point it is locked by the actuation of the lock solenoid 72 in response to a signal from the conveyor controller 36.

Then, the piston 74 is actuated to lift the container 40 on the plunger 45 to the window 61, the door 65 covering the window 61 is opened, and the beverage container 40 is removed. Thereupon, the door 65 is closed, the gate 35 at the upper end of the tube 26 is closed, the pressure control unit 70 is actuated to vent the lower end 33 of the tube 26 to atmosphere, and the motor 41 is operated to apply a vacuum to the tube 26. The vacuum in the tube 26 first draws the plunger 45 to the top of the carrier 31 where it rests against the stop 47. Then, the pressure differential on the plunger 45 causes the carrier 31 to be forced upwardly in the tube 26 toward the pump 41. Pump 41 is turned off as the carrier 31 approaches, allowing the carrier to continue toward the stop 59 at the end 32 of the tube 26. At this position, the carrier 31 may be stored to await another order.

The system of the present invention can also be used without a separate carrier 31, but rather with the packaging container such as the beverage container 40 serving the function of the carrier 31. This is practical with blow molded plastic beverage bottles and other reasonably shatter resistant containers, as for example, container 40a, as illustrated in FIG. 4A, which shows the container 40a being loaded directly into the tube 26 at the loading end 32 of the pneumatic system 30 by actuation of the plunger 45. With such direct loading of the container 40a into the tube 26, the internal cross-section of the tube 25 must match the external cross section of the container 40a. Preferably, the tube 26 is configured to accept standard packaging containers, which, in a bottled beverage vending system, is usually the round cross-section of a beverage bottle.

FIG. 4B illustrates beverage container 40a at a dispensing unit 20a at the discharge end 33 of the pneumatic system 30.

13

Such a pneumatic system may include the air cushion decelerating feature as described above or some other structure to slow the container 40a upon its arrival at the dispensing unit 20a.

FIG. 4C illustrates a food packaging container 40b, such as a plastic tubular can with a wide lid at one end, that is of the same exterior cross section as the plastic beverage container 40a of FIGS. 4A and 4B. In the container 40b may be provided a sandwich 91, which may be delivered heated when selected by a customer. In such system, some sort of heating unit (not shown) such as a warmer that stores the product in heated condition, or microwave unit that heats the product in response to an order. Or the sandwich may be a cold sandwich that is stored under refrigeration. The food product is dispensed and then loaded in its warmed or refrigerated condition into the tube 26 in the same manner as a beverage is loaded, as described above. Similarly, a frozen product such as ice cream or some other food product may be similarly provided. Such product may be placed in the container 40b in a plastic film or paper wrapping or with such other packaging material as is necessary to insure its safe delivery through the tube 26. Such food items are preferably maintained in a prepackaged condition in such container 40b in the storage unit 25.

While the system 10 is disclosed in a gasoline station setting, it should be appreciated that such a system can be used in combination with other vending systems. Some features of the invention can be realized in a stand-alone system for dispensing food or beverages sold independently of other products. For example, in FIG. 5A a system 10a is illustrated in which the pneumatic system 30 thereof has its dispensing unit 20b at the checkout lane of a super market. Such a system 10a may charge the purchase of an purchased item, such as a beverage carried in a container 40a, to a grocery order being accounted for at a check-out counter 95.

A further example is illustrated in FIG. 5B in which a dispensing unit 20c is provided in a system 10b at a recreational location such as a swimming pool or swimming club. Such a unit may contain its own charge card reader or, where at a membership facility or the like, accept a member code and charge the item to the member's account.

Further, FIG. 5C illustrates an example of a dispensing unit 20d of a system 10c that may be preferably associated with a device such as an automated teller machine or other accounting system at which an account of a customer is identified to facilitate a purchase.

FIG. 5D illustrates a system 101 employing principles of the invention in a hotel for replacing a hotel room minibar system or other room supply or delivery system. In such a system 101 includes a pneumatic delivery system delivers food and beverages, towels or personal items to the guests' rooms in response to commands entered by the hotel guest on a data entry device, such as by use of a television set remote controller to select items from a menu displayed on a television screen in the guest's room. Such a system 101 includes a remote storage unit 102, similar to those described in the systems above, selectively connected through a pneumatic delivery system 103 with each of a plurality of guest rooms 104. In the rooms 104 is situated a delivery terminal 105 to which the container carrying the beverage or other product or item is presented to the room guest. The room guest selects the item desired from a menu displayed on the screen 106 of the cable television set 107 in the guest room 104, preferably by entering a menu item code on the channel selector of the television remote controller 108. The command signals are communicated

14

through the television cable connection 109 to hotel office 110 and billing equipment located thereat, which includes circuits programmed to operate automated product selection and loading equipment 111 at the storage unit.

In the hotel system 101, the order commands originating from the guest rooms 104 are identified with the rooms 104 from which the commands originated, and therefore the products ordered may be automatically charged to the guest's room or account. When the guest is out of the room 104 and in another part of the hotel, such as at the swimming pool 115, on a golf course or tennis court or other recreational facility 116 of a resort hotel, in an exercise room 117, or in the hotel lobby, a hall or conference area 118, use of the system to order beverages or other products may result in a charge to the guest's room by the provision of a code entry device such as a key card reader 119, at dispensing terminals 20e, which condition the operation of the system on the entry of a personal identity number or insertion of a machine readable room key card to identify the guest and the guest room account to which the item is to be charged.

In such a hotel system 101, the storage unit may also be provided with a loading port 112 for accepting special food containers 40c manually loaded with food items comparable to room service items prepared by the hotel kitchen 113 in response to the orders entered by the guest in the rooms 104. The system 101 may be similarly provided with a loading port 120 for accepting custom mixed drinks in fillable beverage containers 40d at the hotel bar area 122.

Those skilled in the art will appreciate that there are many uses of the present invention and that the invention is described herein only in preferred embodiments. Accordingly, additions and modifications can be made without departing from the principles of the invention. Therefore, the following is claimed:

I claim:

1. An auxiliary system for vending individually packaged products to customers of a diverse product or service providing system having a payment receiving or charging subsystem associated therewith, wherein:

the diverse vending system includes an accounting subsystem to automatically charge purchases to an account of a customer:

the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system; and

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device to automatically charge a purchase of the vended product to the charge account of the customer.

2. The system of claim 1 wherein:

the product supply includes a product storage unit having a temperature maintained interior; and

15

the product delivery unit is located in an ambient temperature environment.

3. The system of claim 1 wherein:

the pneumatic conveyor includes a hollow carrier moveable therein and adapted to enclose the product therein for transfer from the product supply terminal to the product delivery unit.

4. The system of claim 3 wherein:

the hollow carrier is a reusable hollow carrier.

5. The system of claim 3 wherein:

the order entry device includes a product selector operative to generate a product selection command in response to a product selection act by the customer at the vending location.

6. The system of claim 5 wherein:

the pneumatic conveyor includes a hollow carrier moveable therein and adapted to enclose the product therein for transfer from the product supply terminal to the product delivery unit.

7. The system of claim 1 wherein:

the pneumatic conveyor is configured to receive a packaged product in its packaging container at the supply terminal; and

the pneumatic conveyor is operative, when activated, to apply a pneumatic pressure across the packaging container of the product to move the container and packaged product from the product supply to the product delivery unit.

8. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system;

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein;

the diverse vending system is a gasoline vending system at a gasoline service facility having a gasoline service island which includes a gasoline pump and a credit card reader, and the payment subsystem thereof is a credit card billing subsystem connected to the pump and to a the credit card reader to automatically charge gasoline purchases to a charge account of the customer;

the order entry device and the product delivery unit are located at a gasoline service island; and

the communications link logically interconnects the auxiliary system with the billing subsystem of the gasoline vending system to automatically charge a purchase of the vended product to the charge account of the customer.

16

9. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system;

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein;

the diverse vending system is a product retail facility having a check-out lane thereat, the payment subsystem thereof including a cash register located at the check-out lane for receiving payment or charge identifying from the customer for products vended through the diverse vending system;

the order entry device and the product delivery unit are located at the check-out lane; and

the communications link logically interconnects the auxiliary system with the cash register to automatically include the price of a purchase of the product vended by the auxiliary system to a total at the cash register.

10. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system;

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein;

the diverse vending system is a membership facility of which the customer is a member and the payment subsystem includes a system for charging a membership account of the customer;

17

the order entry device and the product delivery unit are located at the membership facility; and

the communications link logically interconnects the auxiliary system with the payment subsystem and includes means for receiving data identifying the member and automatically charging the purchase of a product vended through the auxiliary system to the membership account of the customer.

11. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system; and

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein the diverse vending system is a guest facility of which the customer is a guest registered to a room, the payment subsystem thereof including the room account of the customer;

the order entry device and the product delivery unit are located in the room of the customer; and

the communications link logically interconnects the auxiliary system with the payment subsystem and includes means for identifying the room of the customer to automatically charge the purchase of the vended product to the room account of the customer.

12. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system;

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein

18

the diverse vending system is a guest facility of which the customer is a guest registered to a room, the payment subsystem thereof including the room account of the customer;

the order entry device and the product delivery unit are located in common space at the guest facility; and

the communications link logically interconnects the auxiliary system with the payment subsystem and includes means for identifying the room of the customer to automatically charge the purchase of the vended product to the room account of the customer.

13. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system; and

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and an automatic packaged product loading device connected to the loading end of the tube and responsive to the control signal to load a product into the tube.

14. An auxiliary system for vending individually packaged products to customers of a diverse product or service vending system having a payment receiving or charging subsystem associated therewith, the auxiliary system comprising:

an order entry device at a vending location accessible to a customer of the diverse system;

a product delivery unit at the vending location;

a product supply at a supply location having a plurality of products thereat;

a pneumatic conveyor responsive to a control signal from the controller, the conveyor including a delivery tube extending from the product supply to the product delivery unit, the tube having a loading end at the product supply and a delivery end connected to the product delivery unit;

a communication link logically interconnecting the auxiliary system with the payment subsystem of the diverse system;

control logic configured to generate the control signal and to cause the communication of transaction price information to the payment subsystem in response to the entry of an order on the order entry device; and wherein:

the product delivery unit is located sufficiently remote from the product supply to permit at least one pedestrian or vehicular access lane or a space dividing partition therebetween.

19

15. A method of vending packaged products comprising the steps of:

providing a product loading station;

providing a customer terminal remotely located from the loading station across an intermediate space sufficient to contain a pedestrian or vehicle access lane, a diverse article support or conveyor or a space divider, partition or thermal barrier, separating the loading station from the customer terminal, the terminal having thereat an order entry device and a product delivery unit;

providing a pneumatic conveyor having a tube extending from a loading station past the intermediate space to the product delivery unit of the customer terminal; then

loading into a tube at the loading station, in response to an order entered through the order entry device by a customer, a product packaged in a packaging container; then

moving the product with pneumatic pressure through the tube from the loading station to the customer terminal.

16. The method of claim 15 wherein:

the customer terminal providing step includes the step of providing the customer terminal in an ambient temperature environment; and

the loading step includes the steps of:

maintaining the product at a non-ambient temperature, and loading the temperature maintained product into the tube.

17. The method of claim 15 wherein:

the differential pressure providing step includes the step of applying differential pressure directly across the packaging container of the product and thereby moving the product without a carrier in its packaging container to the product delivery unit.

18. The method of claim 15 further comprising the steps of:

providing the order entry device with a product selector on which a selection of one of a plurality of products can be selected by a customer; and

the loading step including the step of, in response to a product selection made by the customer with the product selector, loading into the tube at the loading station a selected packaged product in accordance with the product selection.

19. The method of claim 15 further comprising the steps of:

providing payment means for, upon the actuation thereof, charging the price of the product to the customer; and actuating the payment means, in response to the entry of an order through the order device.

20. The method of claim 19 wherein:

the payment means providing step includes the step of connecting the payment means in communication with a payment subsystem of a diverse product or service vending system; and

the method further comprising the step of processing the charging of the price of the product through the payment subsystem of the diverse system.

21. The method of claim 20 wherein the diverse vending system includes a lodging facility for vending guest room accommodations to guests and having a payment subsystem by which room accommodation charges are posted to guest room accounts of the guests, and wherein:

the product loading station is provided at a central location in the lodging facility;

20

one such customer terminal is provided in each of a plurality of the guest rooms of the facility;

the pneumatic conveyor is provided with at least a portion of the tube extending from the loading station to the product delivery unit of each of the customer terminals;

the payment means is provided with a communication link connecting the order entry device of each customer terminal with the payment subsystem of the lodging facility; and

the loading, moving and actuating steps include the steps of processing an order entered on the order entry device in guest room of a guest of the facility, pneumatically delivering an ordered product through the tube to the delivery unit in the guest room of the guest and charging the price of the delivered product to a guest room account of the guest.

22. The method of claim 20 wherein the diverse vending system includes a lodging facility for vending guest room accommodations to guests and having a payment subsystem by which room accommodation charges are posted to guest room accounts of the guests, and wherein:

the product loading station is provided at a central location in the lodging facility;

the customer terminal is provided in a location accessible to guests of the facility;

the payment means is provided with a communication link connecting the order entry device of the customer terminal with the payment subsystem of the lodging facility and includes means for identifying a guest room account of a guest of the facility who is entering an order on the order entry device; and

the loading, moving and actuating steps include the steps of processing an order entered by a guest on the order entry device at the customer terminal, pneumatically delivering an ordered product through the tube to the delivery unit at the customer terminal and charging the price of the delivered product to a guest room account of the guest entering the order.

23. The method of claim 20 wherein the diverse vending system includes a membership facility for vending membership privileges to members of the facility and having a payment subsystem by which membership charges are posted to membership accounts of the members, and wherein:

the product loading station is provided at a central location in the membership facility;

the customer terminal is provided in a location accessible to members of the facility;

the payment means is provided with a communication link connecting the order entry device of the customer terminal with the payment subsystem of the membership facility and includes means for identifying a membership account of a member of the facility who is entering an order on the order entry device; and

the loading, moving and actuating steps include the steps of processing an order entered by a member on the order entry device at the customer terminal, pneumatically delivering an ordered product through the tube to the delivery unit at the customer terminal and charging the price of the delivered product to a membership account of the member entering the order.

24. The method of claim 20 wherein the diverse vending system includes a retail facility for vending goods or services to customers of the facility and having a payment subsystem by which charges are posted to customer accounts of its customers, and wherein:

21

the product loading station is provided at a central location in the retail facility;

the customer terminal is provided in a location accessible to customers of the facility;

the payment means is provided with a communication link connecting the order entry device of the customer terminal with the payment subsystem of the retail facility and includes means for identifying a customer account of a customer of the facility; and

the loading, moving and actuating steps include the steps of processing an order entered by a customer on the order entry device at the customer terminal, pneumatically delivering an ordered product through the tube to the delivery unit at the customer terminal and charging the price of the delivered product to a customer account of the customer entering the order.

25. The method of claim 20 wherein the diverse vending system includes a retail facility for vending goods or services to customers of the facility and having a billing subsystem by which charges for the goods or services purchased in a purchasing transaction by a customer of the facility are posted to customer accounts of the customer, and wherein:

the product loading station is provided at a central location in the retail facility;

the customer terminal is provided in a location occupied by a customer of the facility who is engaged in a goods or services purchasing transaction with the facility;

the payment means is provided with a communication link connecting the order entry device of the customer terminal with the payment subsystem of the retail facility and includes means for charging a customer account of the customer engaged in the purchasing transaction; and

the loading, moving and actuating steps include the steps of processing an order entered by a customer on the order entry device at the customer terminal, pneumatically delivering an ordered product through the tube to the delivery unit at the customer terminal and charging the price of the delivered product to the customer account of the customer engaged in the purchasing transaction.

26. The method of claim 25 wherein the retail facility includes a gasoline service station having a central building and at least one gasoline pump service island spaced across a vehicle access lane for the building, the payment subsystem including a credit card reader at the service island in communication with the payment subsystem by which charges for gasoline purchases by a customer of the gasoline service station are posted to charge accounts of gasoline customers, and wherein:

the product loading station is provided at the central building;

the customer terminal is provided at the gasoline pump service island; and

the loading, moving and actuating steps include the step charging the price of the delivered product to the account of a gasoline customer engaged in a gasoline purchasing transaction.

27. The method of claim 25 wherein the payment subsystem of the retail facility includes a checkout counter having a payment register located thereat for processing charges for the goods or services purchased by a customer of the facility in the purchasing transaction, and wherein:

the customer terminal is provided adjacent an area occupied by a customer whose purchasing transaction is being processed at the register; and

22

the loading, moving and actuating steps include the step charging the price of the delivered product to the transaction of the customer being processed at the register.

28. The method of claim 19 wherein:

the customer terminal is provided adjacent a vehicle access lane;

the loading station is in a structure occupied by a food preparation operation;

the loading step includes the steps of preparing food products in the structure and, in response to the order entered through the order entry device, packaging the prepared food in a packaging container, inserting the packaged food into the tube and pneumatically moving the packaged food in its container to the product delivery unit.

29. The method of claim 19 further comprising the steps of:

in response to the order entered through the order entry device, mixing a beverage in the vicinity of the loading station, packaging the mixed beverage in a packaging container, inserting the packaged beverage into the tube and pneumatically moving the packaged beverage in its container to the product delivery unit.

30. A system for vending packaged products comprising: a product loading station;

terminal means for receiving order commands from a customer and presenting products to a customer thereat, the remote terminal means including a product delivery unit;

the product supply terminal being physically separated from the remote terminal by an intervening building structure or partition or an otherwise useful space that is part of neither the loading station or the supply terminal;

a pneumatic conveyor having a tube extending from a loading station to the product delivery unit of the remote terminal means;

means for actuating the conveyor in response to an order entered through the order entry device by a customer to move a packaged product packaged to the product delivery unit remote terminal means; and

the pneumatic conveyor extending from the loading station across the structure or space, between the two locations, to the dispensing unit.

31. The system of claim 30 wherein:

the actuating means includes means for applying differential pressure directly across the packaging container of the product and thereby moving the product without a carrier in its packaging container to the product delivery unit.

32. The system of claim 30 wherein:

the remote terminal means includes means for selecting one of a plurality of products; and

the system further includes means at the loading station responsive to the selecting means for loading a selected packaged product into the tube.

33. The system of claim 30 further comprising:

payment means for processing the charging of the price of the product to the customer.

34. The system of claim 33 wherein:

the payment means includes means for communicating with a payment subsystem of a diverse product or service vending system for processing the charging of the price of the product.

23

35. A system for vending packaged products comprising:
a product loading station;
remote terminal means for receiving order commands
from a customer and presenting products to a customer 5
thereat;
a pneumatic conveyor having a tube extending from a
loading station to the product delivery unit of the
remote terminal;

24

means for actuating the conveyor in response to an order
entered through the order entry device by a customer to
move a packaged product packaged to the product
delivery unit;
restockable supply means at the loading station; and
means at the loading station responsive to the quantity of
products in the supply means for generating an restock-
ing signal to a supplier.

* * * * *

EXHIBIT D



US005992570A

United States Patent [19]
Walter et al.

[11] **Patent Number:** **5,992,570**
[45] **Date of Patent:** **Nov. 30, 1999**

[54] **SELF-SERVICE CHECKOUT APPARATUS**

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[21] Appl. No.: **08/925,698**

[22] Filed: **Sep. 9, 1997**

Related U.S. Application Data

[63] Continuation of application No. 08/658,420, Jun. 5, 1996,
abandoned.

[51] **Int. Cl.**⁶ **A47F 9/04**

[52] **U.S. Cl.** **186/36; 186/37; 186/61**

[58] **Field of Search** **186/36, 37, 52,**
186/59, 60, 61, 62, 68; 235/383

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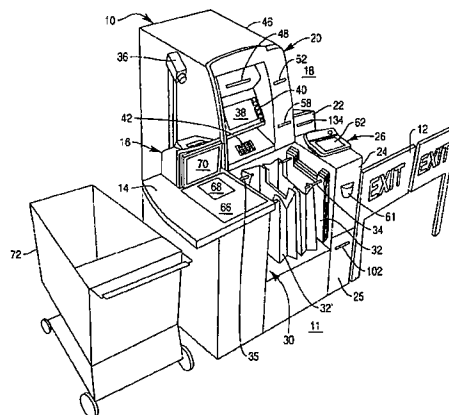
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Primary Examiner—F. J. Bartuska

[57] **ABSTRACT**

A self-service checkout apparatus for processing items selected by a customer for purchase includes a customer operated device, such as a scanner/scale, for identifying each item selected for purchase. The apparatus also includes a self-service terminal which includes a card or cash payment accepting device, a cash dispensing device for providing a customer with cash by way of change or cashback, and an electronic controller connected to the customer operated device and arranged to determine the price of each item identified by the customer operated device. The terminal displays the total amount payable on a screen. A customer exit is normally closed by a security gate which is arranged to be opened in response to the customer making payment for the total amount. The terminal can be used to provide ATM services independently of a checkout transaction.

28 Claims, 17 Drawing Sheets



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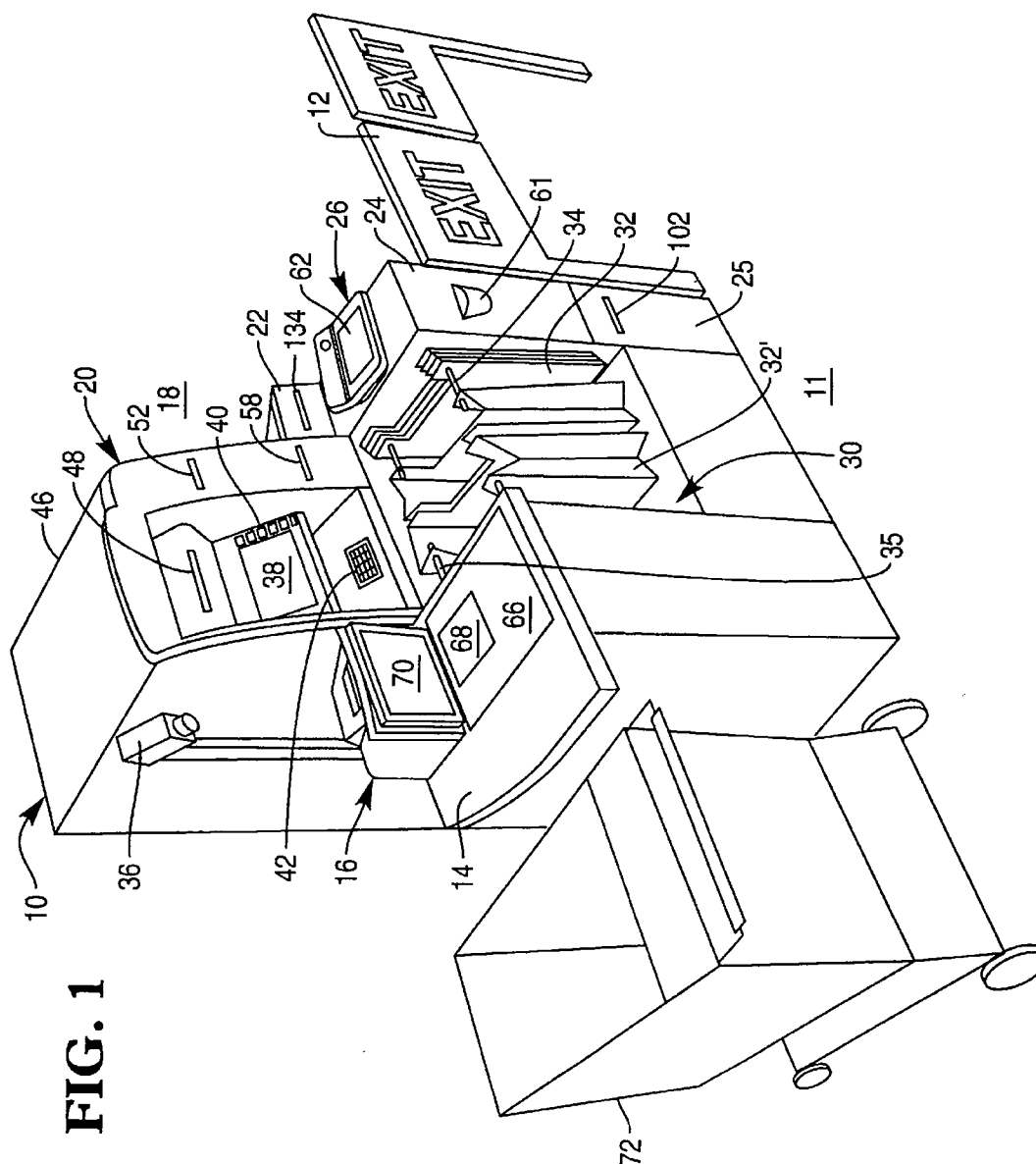
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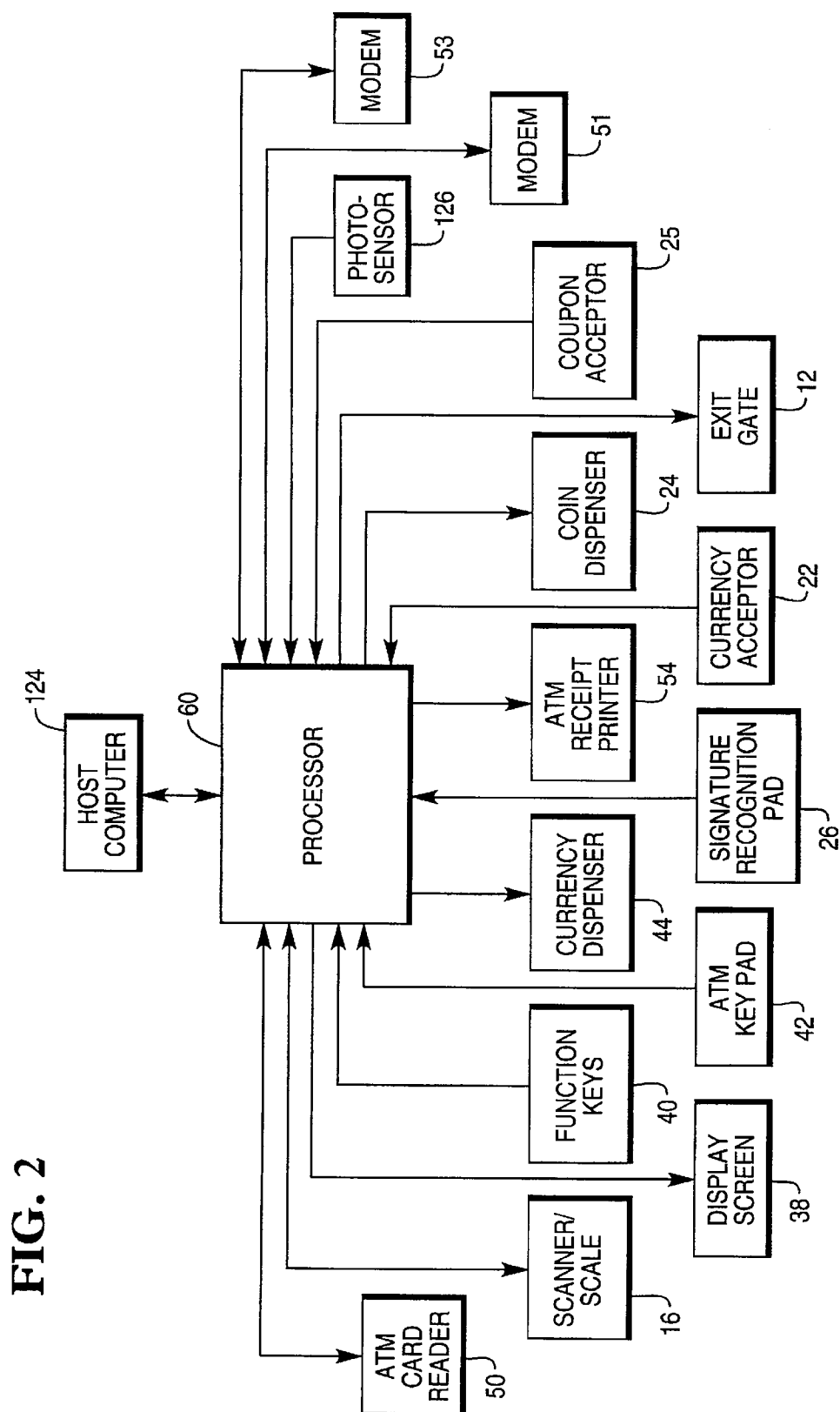


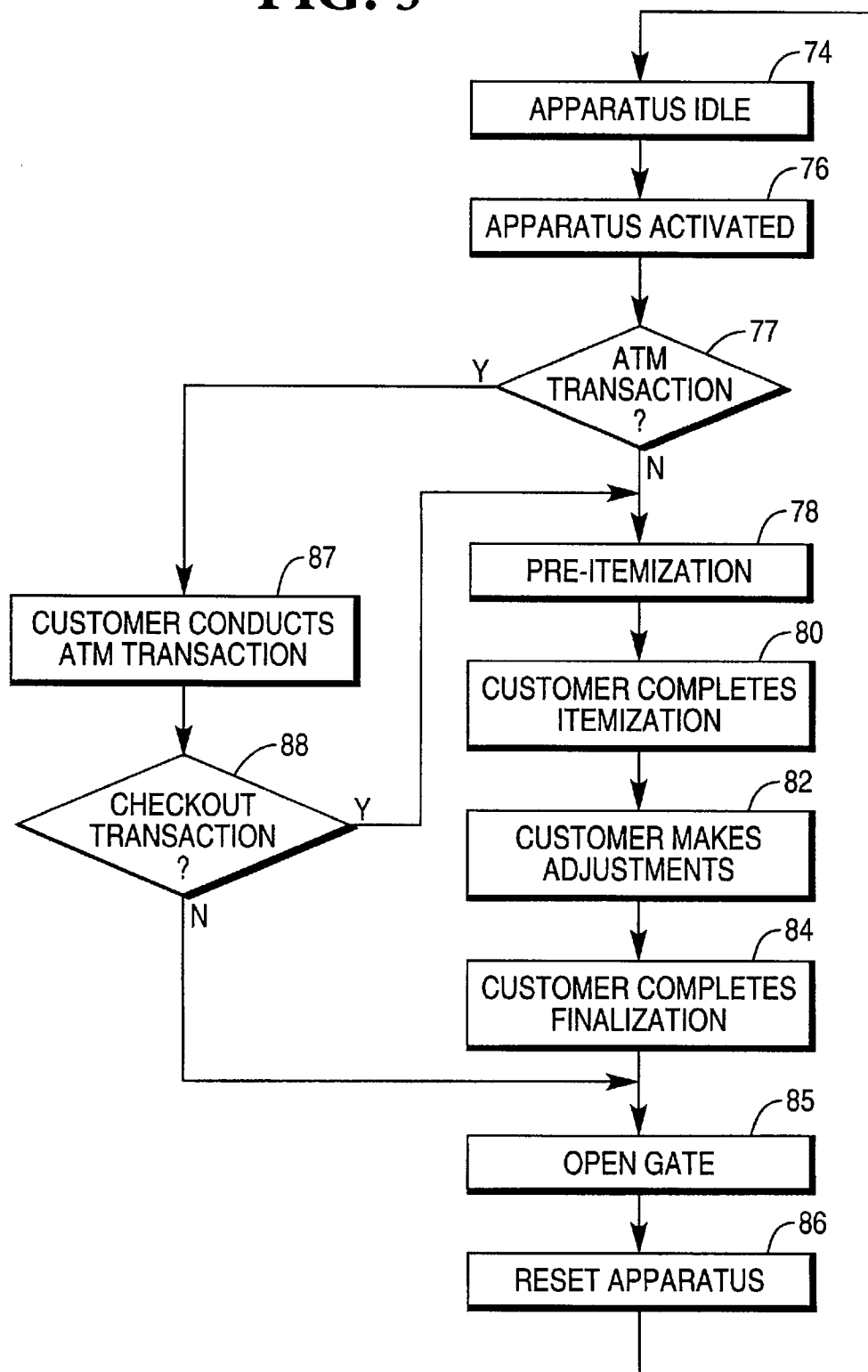
FIG. 3

FIG. 4

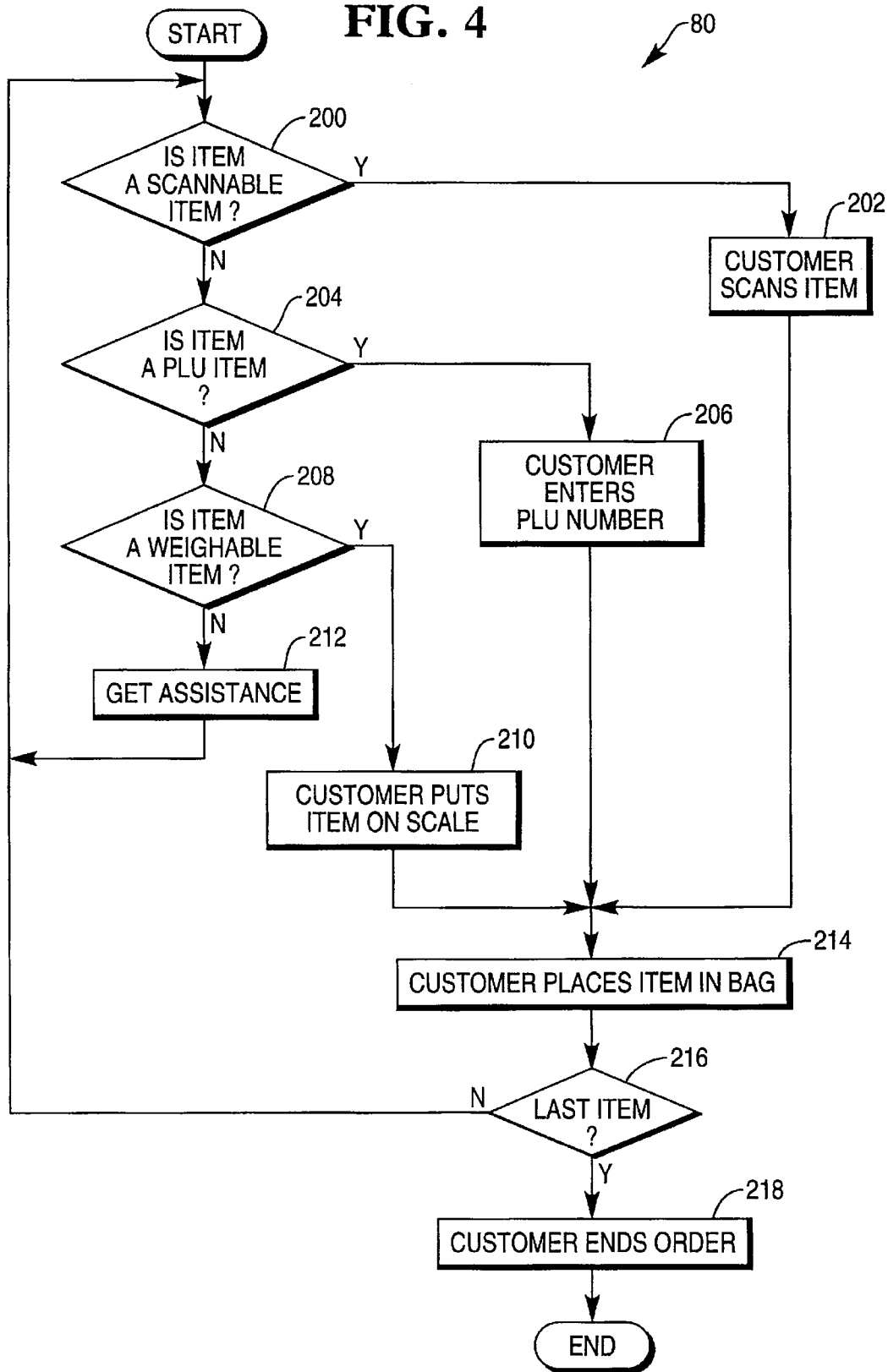


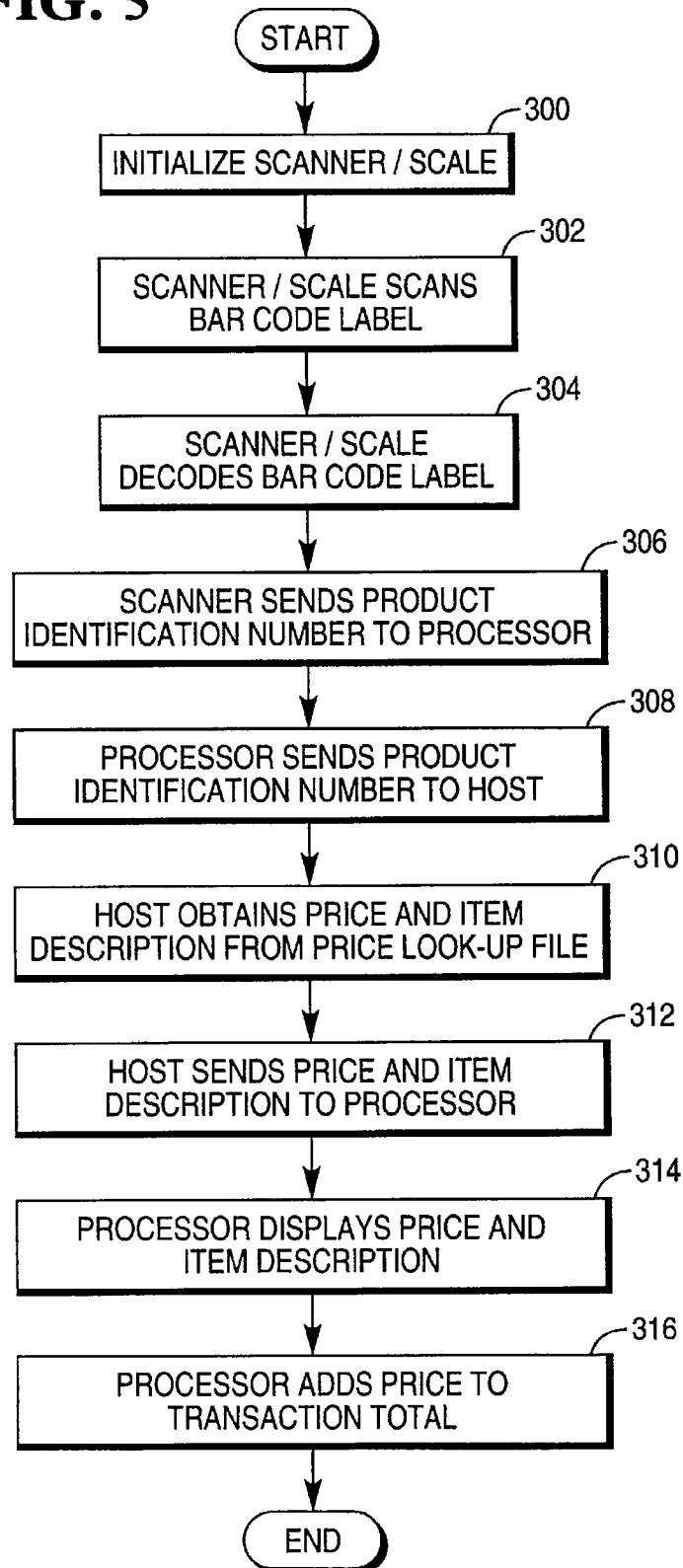
FIG. 5

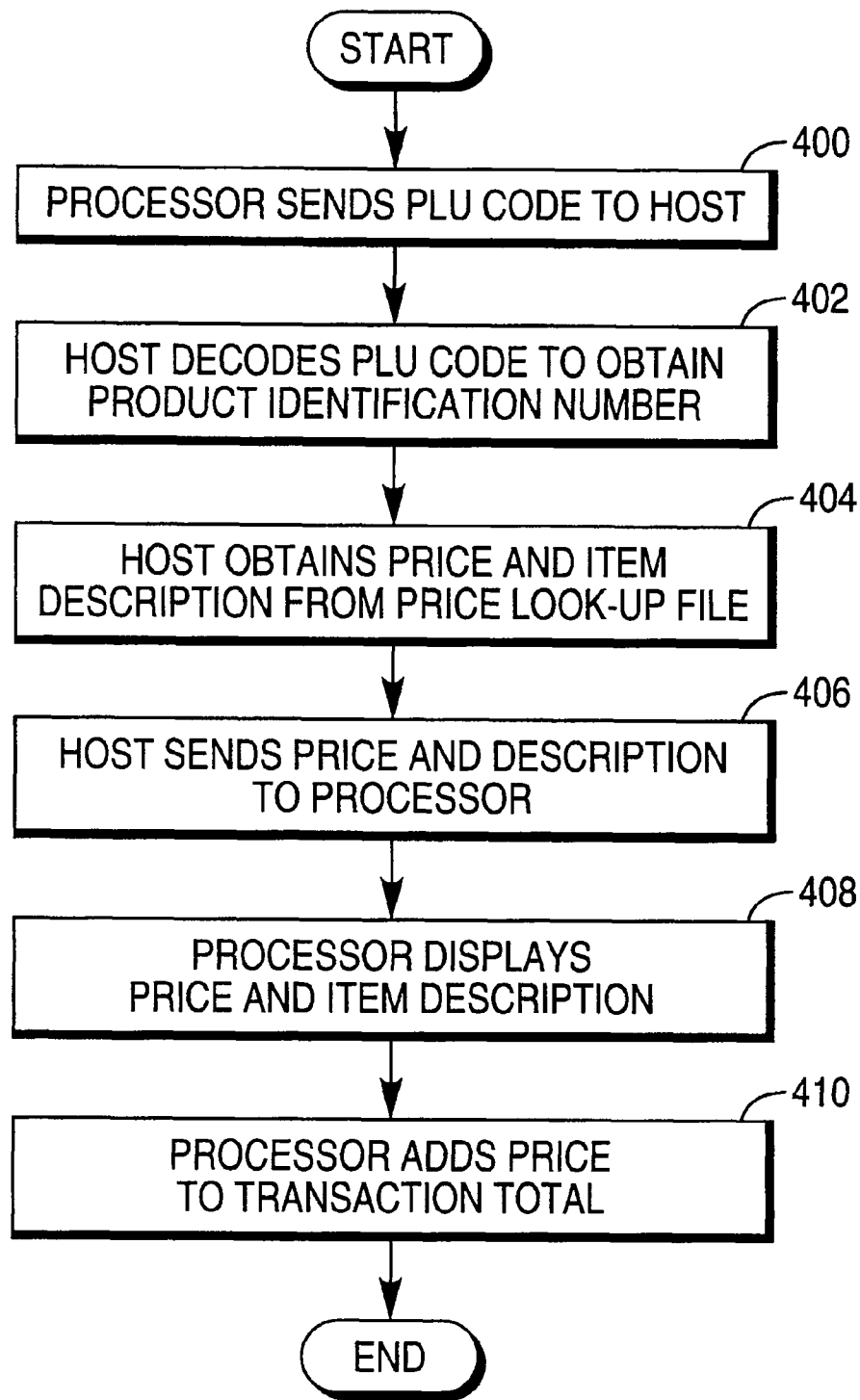
FIG. 6

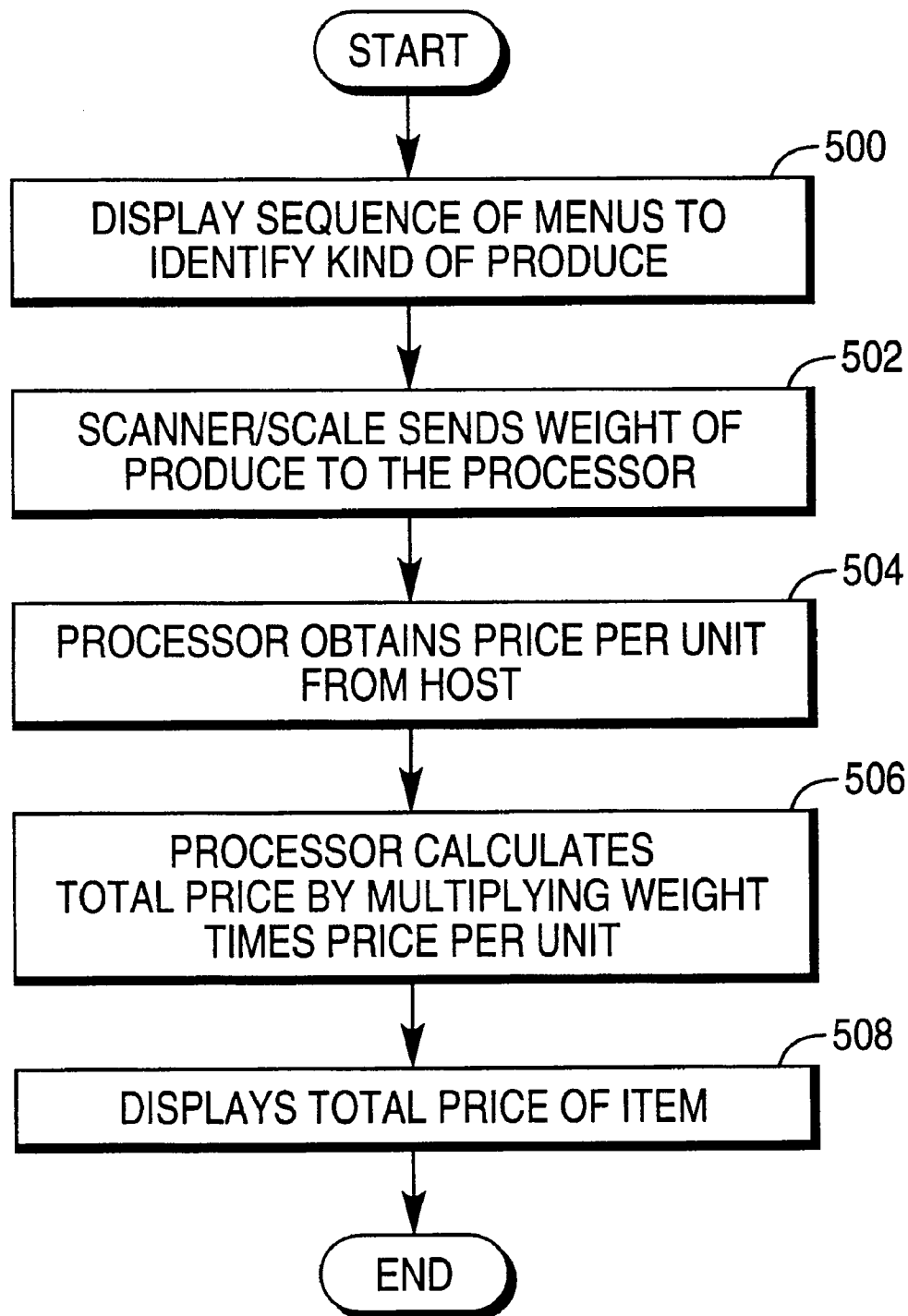
FIG. 7

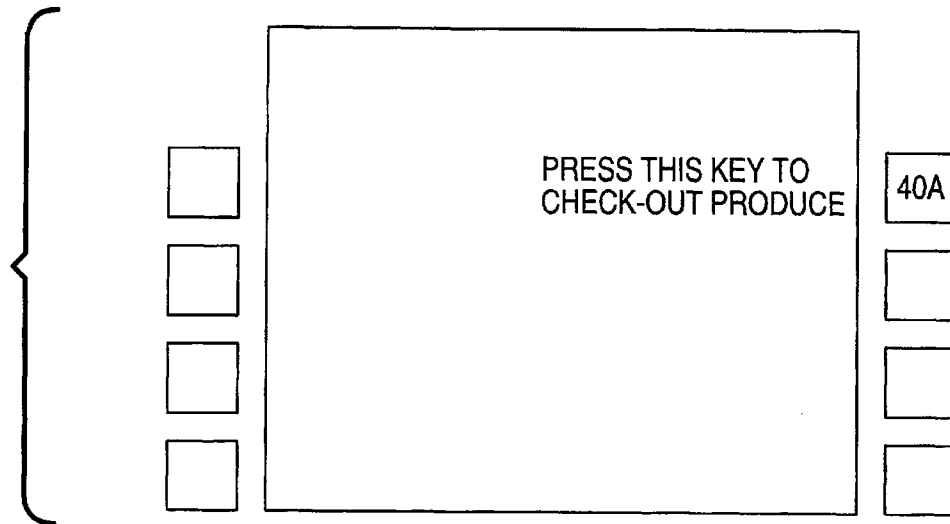
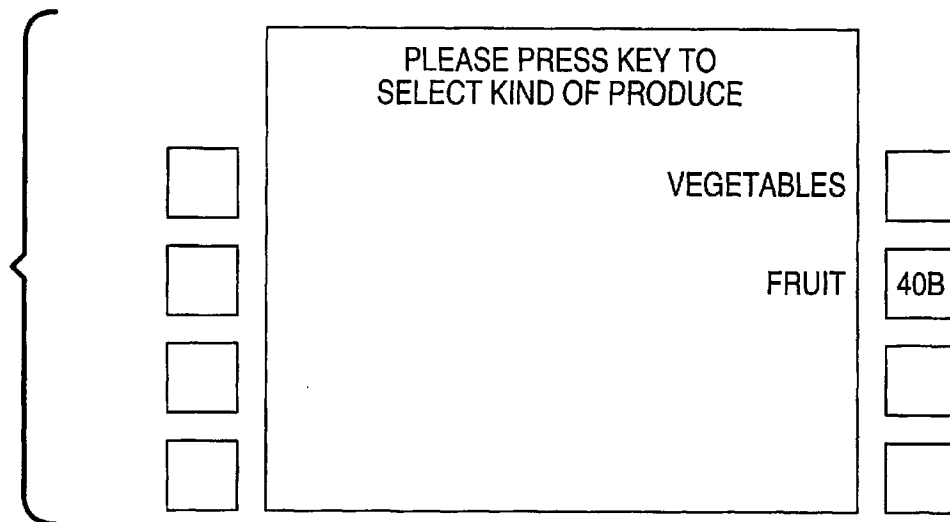
FIG. 8**FIG. 9**

FIG. 10

PLEASE PRESS KEY TO
SELECT FRUIT

BANANAS

APPLES

ORANGES

GRAPES

PEARS

40C

FIG. 11

YOU HAVE SELECTED APPLES PLEASE
PRESS KEY TO SELECT TYPE OF APPLE

MACINTOSH REDS

GOLDEN DELICIOUS

GRANNY SMITHS

40D

FIG. 12

YOU HAVE SELECTED
GOLDEN DELICIOUS APPLES

PRICE 75P / POUND
WEIGHT 3 POUNDS
PRICE IS £2.25

MORE PRODUCE?

NO YES

40F 40E

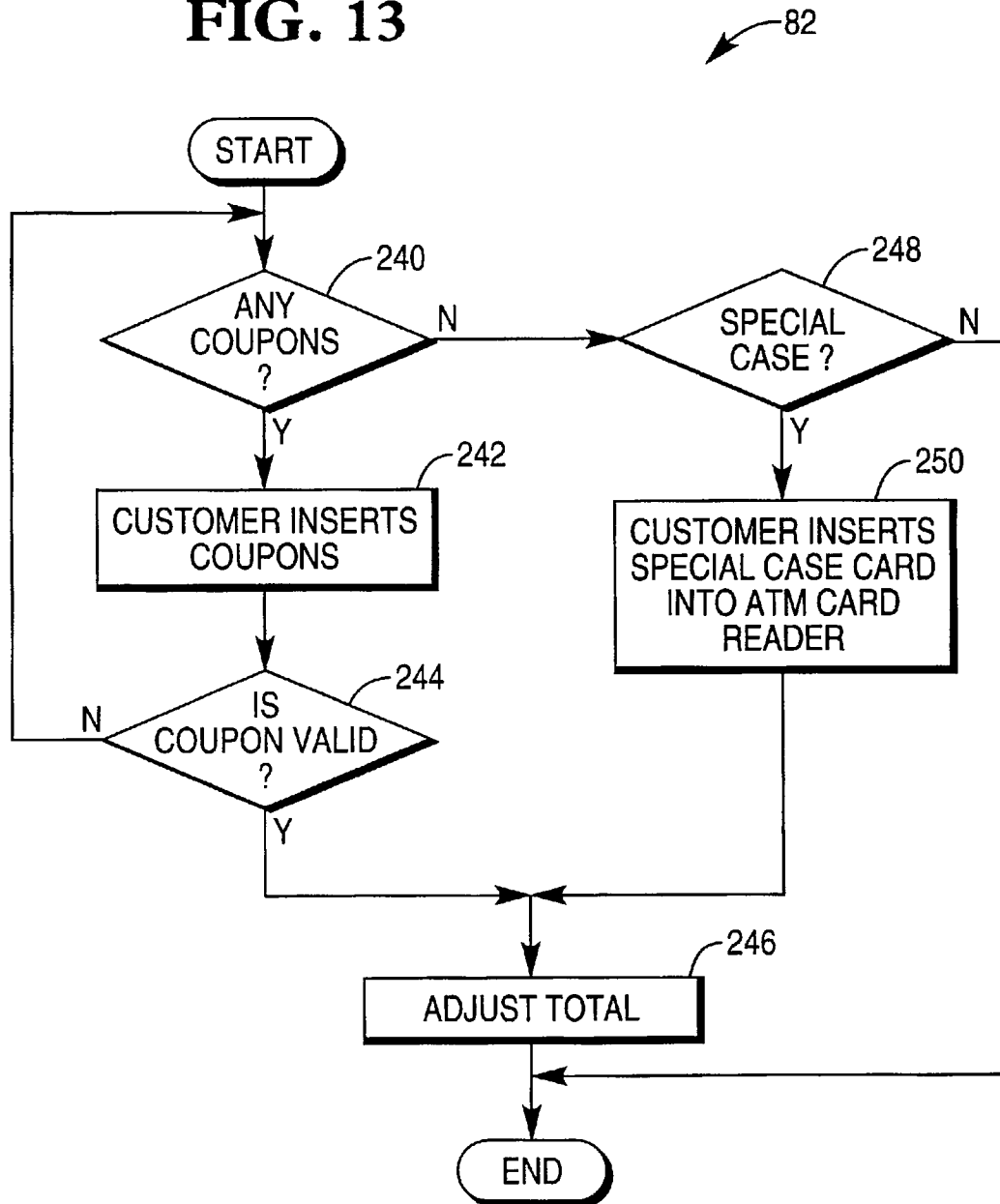
FIG. 13

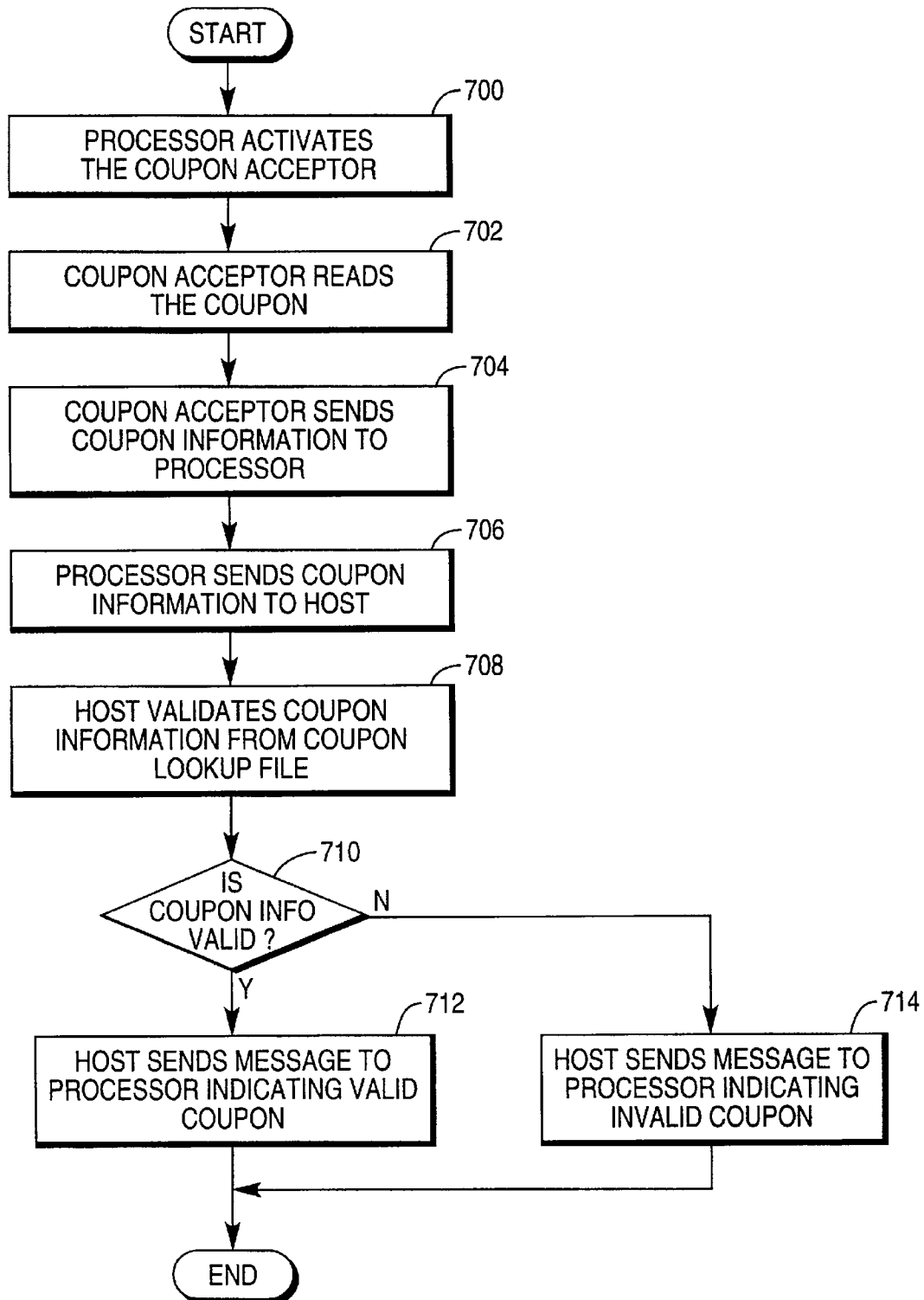
FIG. 14

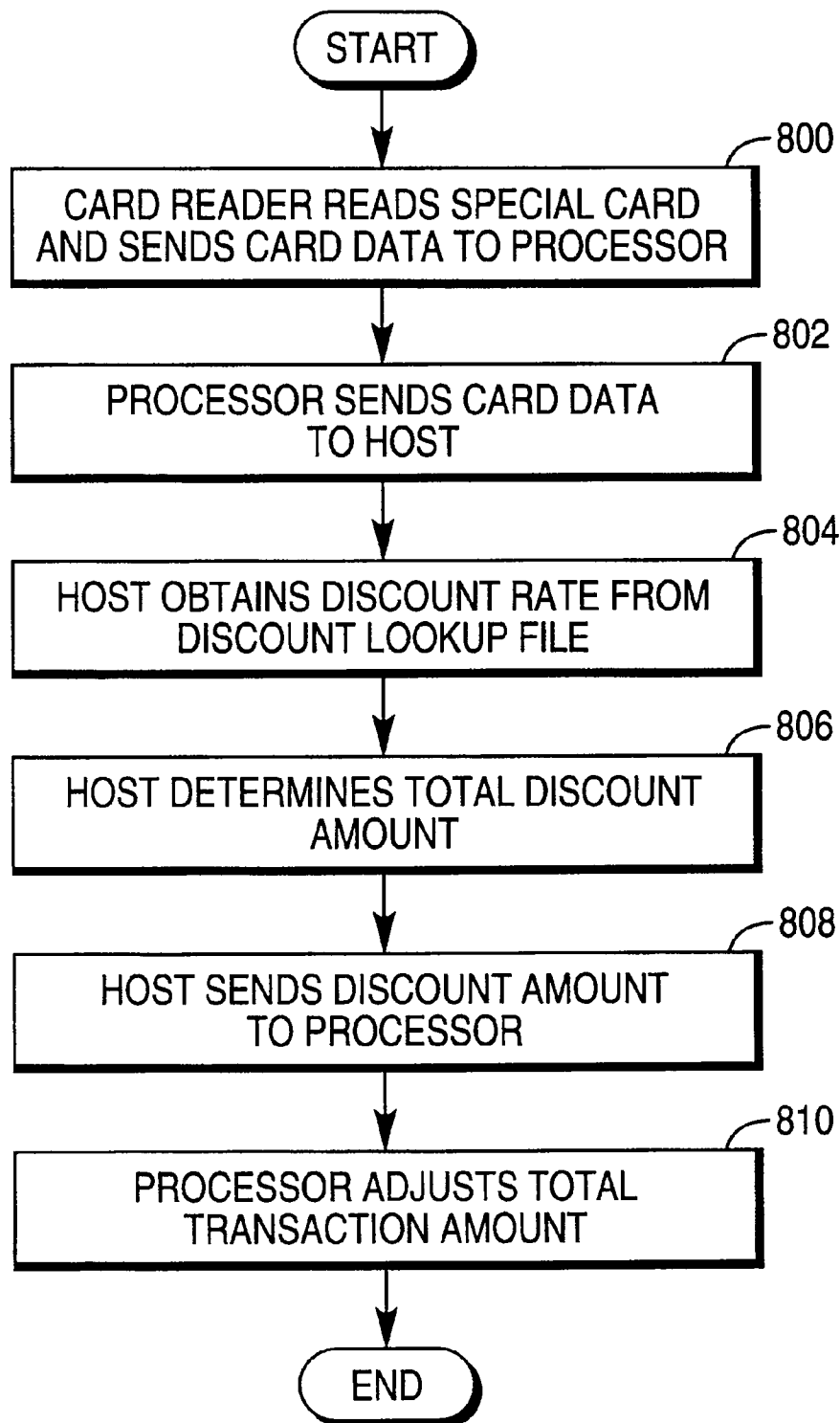
FIG. 15

FIG. 16